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GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN



GRADUATE AND UNDERGRADUATE STUDY

Catalog Issue 1947-48

WASHINGTON ~ AUGUST 1947

This Bulletin, published annually by the Graduate School, covers graduate and undergraduate programs for the Fall and Spring Semesters and the Summer Session. It is made as accurate as possible, but the right is reserved to make changes in details as circumstances require. A bulletin on correspondence study is available to field employees of the Department of Agriculture.

Calendar for the 27th School Year, 1947-48

Fall Semester

- September 8—Registration begins
- September 22, Monday—Fall Semester begins
- September 22 to 26—All classes begin unless other date is given in Time Schedule Bulletin
- October 3—Last day of registration for credit
- October 3, Friday—End of refund period and last day of registration, or registration transfer without payment of extra fee
- November 3—Last day to make deferred payments
- November 11, Armistice Day—No classes
- November 27, Thanksgiving holiday—No classes
- December 20, Saturday—Christmas holidays begin; no classes
- January 5, Monday—Classes resume after holidays
- January 16, Friday—Close of Fall Semester *

Spring Semester

- January 12—Registration begins
- February 2, Monday—Spring Semester begins
- February 2 to 6—All classes begin unless other date is given in Time Schedule Bulletin
- February 13—Last day of registration for credit
- February 13, Friday—End of refund period and last day of registration, or registration transfer without payment of extra fee
- March 15—Last day to make deferred payments
- May 14, Friday—Close of Spring Semester *

Summer Session

- May 17—Registration begins
- June 1 to 7—All classes begin unless other date is given in Time Schedule Bulletin

* Classes which have missed sessions because of the restoration of holidays in the Federal service or for any other reason will continue until deficiency is made up.

Business Office—Room 1031, South Agriculture Building
Between 12th and 14th on Independence Avenue, SW.
Hours—9:00 A.M. to 6:20 P.M., Monday through Friday
Telephone—Republic 4142, Extension 6337

GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN

FALL — SPRING — SUMMER

1947 — 1948



*Please keep this catalog for use in
the Spring and Summer. New copies
will not be available at that time.*

WASHINGTON ~ AUGUST, 1947

Contents

PAGE

General Information

History and Objectives	5
Program of the Graduate School	6
Publications	8
Short Courses and Institutes	8
Lectures	8
Counseling Service	11
Library Facilities	11
Accreditation	12
General Graduate Degree Requirements	12
Certified Statements of Accomplishment	13

Regulations and Procedures

Admission	14
Veterans	14
Entrance Requirements	14
Course Prerequisites	14
Classification of Courses	15
Registration Regulations	15
Attendance at Classes	15
Withdrawal	16
Credit and Grades	16
Transfer of Credit	16
Fees	16

Departments of Instruction

Biological Sciences	19
Languages and Literature	23
Mathematics and Statistics	35
Office Techniques and Operations	48
Physical Sciences	58
Public Administration	66
Social Sciences	85
Technology	115

Faculty	127
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Index	145
-------------	-----

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CLINTON P. ANDERSON, *Secretary of Agriculture*

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* United States Department of Agriculture.

General Information

HISTORY AND OBJECTIVES

The Graduate School was established in 1921 to stimulate and encourage post-entry education and to afford opportunities for the education and training of employees of the Department of Agriculture. From the beginning, however, courses have been open to all qualified Federal employees and to other persons as facilities permit.

Soon after the close of World War I, the Congressional Joint Committee on the Reclassification of Salaries recommended that Government departments give more attention to the development of opportunity, in the Federal Service, for continued education. A special committee was appointed by the Secretary of Agriculture to find ways of providing opportunity for Department employees to advance professionally, thus improving their service to Agriculture. The resultant plan led to the establishment of the United States Department of Agriculture Graduate School.

In its more than a quarter-century experience in meeting the changing educational needs of Federal employees, the School has developed into a graduate school, an in-service training institute, and an adult education organization. It has grown from an original faculty of ten and an annual enrollment of 300 to a faculty of more than 300 and an average enrollment of from 5000 to 7000.

The major objectives and functions are stated in the regulations issued by the Secretary of Agriculture which govern the Graduate School:

“ . . . Such activities shall include, but shall not be necessarily limited to, organizing, coordinating or administering, or rendering assistance therein, in cooperation with the several bureaus of the Department, and where appropriate other departments and agencies:

1. Graduate education for the convenience of employees who desire advanced degrees but find it difficult, both for personal and official reasons, to complete all study in residence at another institution;
2. Educational and experience opportunities in those subjects and areas in which the Department and Government have unique facilities and resources;
3. Cooperative programs with the land-grant and other institutions and agencies under which members of these institutions and agencies may utilize to advantage educational and experience opportunities represented by the unique facilities and resources of the Department and Government;
4. Programs under which Department employees may take advantage of educational and experience opportunities, related to their work in the Department, at the land-grant and other institutions and agencies;

5. Educational opportunities for employees to train themselves, on their own time and at their own expense, for proficiency in their present positions and for advancement to positions of greater responsibility;
6. Opportunities for professional, administrative and technical employees to keep abreast of latest developments in their respective fields so that they may perform more effectively the responsibilities assigned to them;
7. Cultural, creative and leisure time opportunities;
8. Cooperation, on behalf of the Department, with other departments and agencies in undertakings designed to develop, through educational activities, the improvement of the service and the increasing of employee usefulness."¹

ADMINISTRATION

The organization and administration of the School are simple and effective. Its government is vested in a General Administration Board appointed by the Secretary of Agriculture. Functions of this Board, made up of administrative and scientific officials of the Department, correspond in general to those of boards of trustees of universities. The Board sets policy, serves as the reviewing and approving authority in connection with the annual budget, and functions generally with respect to problems at this level. The School is administered by a director and a small administrative staff. It is a self-supporting non-profit institution and receives no Federal funds.

The program of the Graduate School reflects the needs of the Federal service. The resident program is organized into eight departments. Each department is under the direction of a departmental committee made up of outstanding specialists in a given field. Departmental committees, with assistance of subcommittees, are charged with the responsibility of organizing, evaluating, readjusting, and giving general administrative direction to the programs for which they are responsible.

PROGRAM OF THE GRADUATE SCHOOL

Enhancement of morale and competence among employees of the Department of Agriculture and other Federal agencies is the chief justification for the Graduate School. The School contributes substantially to forward-looking personnel administration by supplying opportunities to escape blind-alley positions, to prepare for promotions, to find creative after-hours outlets, to escape from office

¹ "United States Department of Agriculture Regulations Governing the Graduate School of the Department of Agriculture Promulgated Pursuant to the Authority Contained in the Act of May 15, 1862 (R. S. § 520 (1878), 5 U. S. C. § 511 (1940)), the Joint Resolution of April 12, 1892, 27 Stat. 395, and the Deficiency Appropriation Act of March 3, 1901, 31 Stat. 1010, 1039 (20 U. S. C. Sec. 91 (1940))." (Revised February 21, 1947.)

routines, to cultivate genuine interests, to gain self-improvement, to find intellectual challenges equal to one's capacity, to keep abreast of an entire field or series of fields of knowledge when the daily job may require knowledge of only one small segment of a single field, and to understand and appreciate relationships between one's own special task and the tasks of others. The relation of this program to Departmental management is recognized by Secretarial Memorandum, which names the Director of Personnel as Chairman of the General Administration Board of the School.

The entire program of the School is based on the belief that work and study can be combined to the advantage of both, work giving meaning and motive to the learning process, and study supplying understanding and competence to the work situation. The School also operates in the conviction that after-work activities and off-the-job environment have a vital relation to morale and performance on the job. The public interest is served by providing Federal employees with broad opportunities for continuation study along the lines of their general interest as individuals as well as their special interests as employees. President Truman, in recognizing the 25th anniversary said that the Graduate School ". . . has proved to be one of our most significant and productive instruments for better government."

RESIDENT PROGRAM

Graduate School curricula consist chiefly of programs of instruction offered in Washington. Geared as it is to the needs of the Federal Service, the School program reflects the emphases of the Service. The programs in public administration, mathematics and statistics, and social sciences are especially broad. Through seminars and lectures top-level scientific and administrative officials keep up-to-date with the latest developments in their respective fields of work.

FIELD PROGRAM

The Graduate School offers a limited number of correspondence courses intended primarily for the benefit of field employees of the Department of Agriculture. Other Federal employees are admitted as staff and facilities permit.

The problem of meeting the needs of field employees is important because the greater number of the employees of the Department of Agriculture are stationed throughout the United States. Here the Graduate School helps field groups identify their needs and, in cooperation with them, arranges for the nearest appropriate institution to adapt existing courses or to offer new courses directed specifically to the needs of the groups involved.

RELATED ACTIVITIES AND SERVICES

There are unique facilities in Washington for research work to be used for theses, and for general study and graduate work. Many Federal employees wish to finish work toward advanced degrees; many graduate students from universities wish to supplement their academic training with work experience or develop acceptable research problems. Much of the service of the Graduate School is of a consultative, coordinating and integrating nature, working on the effective meeting of educational problems which concern a particular bureau, the Department of Agriculture as a whole, or agencies elsewhere in Government.

GRADUATE SCHOOL PUBLICATIONS

Graduate School publications are as follows:

1. A general Bulletin which contains detailed information about the School and the various course offerings.
2. Time Schedule and Supplement published each semester, fall, spring and summer.
3. Books and periodicals; published at irregular intervals and containing original contributions by faculty members, special lecturers or Department of Agriculture employees on subjects devoted to the advancement of the arts, the sciences, and in particular to the development of literature in the field of better government. A partial list of these publications is given on the outside back cover of this Bulletin.

SHORT COURSES AND INSTITUTES

From time to time the Graduate School holds, at Washington, D. C., short courses or institutes for various groups of Departmental employees. These consist of intensive training programs or courses ranging in duration from one week to several weeks. The program is composed of specialized series of lectures, discussions and demonstrations directed by authorities in the field, selected from faculties of colleges and universities, employees of the Department of Agriculture and other Federal agencies, as well as from public and private institutions.

LECTURES

Each year the program in Washington includes several series of lectures in a variety of fields, by authorities of national and international standing. Some of the series are on topics of general interest, others are on technical subjects and are a part of an advanced

seminar; some are presented without charge, for others a fee is required. While all are open to the public, a good many require technical experience and competence in the subject matter concerned. Representative of lectures presented in 1946-47 are the following.

Continuing its long-standing practice of bringing annually to Washington outstanding leaders in statistical thinking, the Department of Mathematics and Statistics presented a lecture series on sampling by Professor P. C. Mahalanobis, F.R.S., Presidency College, Calcutta, one of the world's renowned statisticians, and editor of *Sankhya*, The Indian Journal of Statistics. This department also continued its annual lectures and seminars on sampling and statistical inference. The Department of Public Administration presented a series on "What We Learned in Public Administration During the War." These were given by J. Donald Kingsley, Deputy Director, Office of War Mobilization and Reconversion; Bernard L. Gladieux, Executive Assistant to the Secretary of Commerce; L. W. Hoelscher, Assistant Chief, Division of Administrative Management, Bureau of the Budget; Wallace S. Sayre, Professor of Administration, Cornell University; Neil Dalton, Deputy National Housing Expediter, National Housing Agency; William Anderson, Professor of Political Science, University of Minnesota; Charles S. Ascher, Regional Housing Expediter, Region 2, National Housing Agency; and Herbert Emmerich, Director, Public Administration Clearing House.

A series on Antibiotics, presented by the Department of Biological Sciences, included such men as Drs. Robert D. Coghill, William J. Robbins, Oskar Wintersteiner, Selman A. Waksman, Karl Folkers, Vincent du Vigneaud, C. S. Keefer, Kenneth B. Raper, Rene J. Dubos, O. K. Behrens and others. A series of particular interest to Department of Agriculture employees, on current agricultural policies, included Harry R. Wellman of the University of California; Dr. D. A. FitzGerald, Secretary General, IEPC; Harry D. White, Director, International Stabilization Fund; Dr. John D. Black of Harvard; Judge Marvin Jones, Chief Justice, U. S. Court of Claims; Msgr. Ligutti, National Catholic Rural Life Conference; Dr. T. W. Schultz of the University of Chicago; Chester C. Davis, President, Federal Reserve Bank of St. Louis; O. V. Wells, Chief, Bureau of Agricultural Economics; L. A. Wheeler, Director, Foreign Agricultural Relations; and Clinton P. Anderson, Secretary of Agriculture. Other lectures covered such varying topics as Modern Engineering Materials, Color Photography, and Insecticides and Fungicides.

Included among lectures scheduled for this year are series on Agricultural Programs, Background and Programme of Food and Agriculture Organization of United Nations, National and International Policies Affecting Agriculture, Physics of the Upper Atmosphere, Photography, Recent Developments in Plant Physiology and Plant Nutrition, Advances in Plant Breeding and Genetics, Engineering Materials, and Sampling. Details of these and other lectures will be found in material appearing under the several departments.

FACULTY

The tradition of a strong faculty in the Graduate School dates from its first year. The following men comprised the initial staff of ten:

Natural Sciences

- *Dr. C. O. Appleman, now Dean of the Graduate School, University of Maryland.
- *Dr. Burton E. Livingston, now Professor Emeritus of Plant Physiology, Johns Hopkins University.
- *Dr. C. L. Shear, now retired; formerly Principal Pathologist in charge of Mycology and Disease Survey, USDA.
- *Dr. Richard C. Tolman, now Dean of the Graduate School and Professor of Physical Chemistry and Mathematical Physics, California Institute of Technology.
- *Dr. Edgar T. Wherry, now Professor of Botany, University of Pennsylvania.
- *Dr. Sewall Wright, now Burton Distinguished Service Professor of Zoology, University of Chicago.

Social Sciences

Dr. Alexander E. Cance, now Professor Emeritus of Economics, Massachusetts State College.

Dr. Henry C. Taylor, now Director of the Farm Foundation; formerly Chief, Bureau of Agricultural Economics, USDA.

Mr. Howard R. Tolley, now Deputy Administrator and Chief Economist, Food and Agriculture Organization; formerly Chief, Bureau of Agricultural Economics, USDA.

Dr. Oscar C. Stine, Assistant Chief for Prices and Marketing, Bureau of Agricultural Economics, USDA.

No reference to the initial staff of the Graduate School would be complete without including the name of Dr. Albert F. Woods,

* Starred in *American Men of Science* for distinction in his special field.

Director Emeritus. Dr. Woods was Director of the Graduate School from 1926 to 1940 and Director Emeritus and Educational Adviser from that date until his retirement on December 31, 1946. More than any other one person Dr. Woods is responsible for the development of the Graduate School.

The School has always emphasized the human, non-physical element—teachers and students—in the educational process. The faculty is drawn almost entirely from the Federal service, a source of talent and expertness unexcelled anywhere in the nation. Professional competence is the sole criterion of selection. Faculty members combine excellent academic training, college teaching experience, and daily practice in the application of the subject matter taught.

COUNSELING SERVICES

Careful planning is important for any prospective student, but particularly so for the Federal employee who wishes to make a substantial beginning in his educational program through the Graduate School, where degrees are not granted and credits must eventually be transferred to a degree-conferring institution.

The most vital single factor in studying for a degree is the setting up of a program which includes a group of logically related courses in a special field of scientific or professional study. Unless his courses are reasonably related to form an organic field of study, he may be disappointed in the amount of credit which will be granted him when he transfers to another school.

Officers of the Graduate School are available, from 9–5 each day (9–6:20 during registration periods) for counseling on educational plans, whether to be pursued in the Graduate School or in other institutions. In addition, where necessary, arrangements are made to refer persons having special problems to authorities in the particular field of work or study.

LIBRARY FACILITIES

The Department of Agriculture Library, containing over half a million books, is the Graduate School Library. It is open to students from 8:30 a.m. to 8:30 p.m., Monday through Friday, and 9:00 a.m. to 1:00 p.m. on Saturdays. Special collections of books, designated as required reading by the instructors, are available for use in the Reading Room or for circulation to Graduate School students. Other libraries in the District—The Library of Congress, public libraries and libraries of Government agencies, offer excellent opportunities for study and research.

ACCREDITMENT

The Graduate School does not grant degrees and has never sought that authority; therefore it has not asked to be accredited by any of the accrediting agencies. It prefers to give courses of standard graduate and undergraduate grade; to have the merits of these courses judged by the caliber and well-known competence of its instructors; and to cooperate with existing institutions having degree-granting authority.

The United States Civil Service Commission accepts Graduate School credits, the same as those from recognized colleges and universities, for examination and qualification purposes.

GENERAL GRADUATE DEGREE REQUIREMENTS

To aid the student in planning his program, degree requirements are summarized below.

Consultation with Graduate Deans. Graduate students should arrange their programs in advance through the dean of the graduate school of the institution from which the student contemplates taking his degree. Latest catalogs of representative colleges and universities are available for examination in the Graduate School business office. Catalogs of the Land-Grant Colleges are available for examination in the Department of Agriculture Library.

Master's Degrees. Degree-granting institutions will generally permit six semester hours of graduate credit to be transferred from another institution, including the Graduate School of the Department of Agriculture. Some institutions, including some in the District of Columbia, require that all study for the Master's degree be taken in residence. In some institutions more than six hours may be transferred from the Graduate School of the Department of Agriculture when the additional work is taken with the approval of the head of the student's major department and the graduate dean in the degree-granting institution.

Doctor's Degrees. Almost universal academic practice permits the graduate student to complete two of the three years' work necessary for the doctorate outside the degree-granting institution, or a year beyond the Master's degree. Most students will find it advantageous to take the last year in residence.

Undergraduate Deficiencies. Graduate schools generally permit deficiencies to be made up out of residence. Those students who have deficiencies pointed out by their graduate deans may make them up in the undergraduate courses offered by the Graduate School of the Department of Agriculture.

Language Requirements. It is possible for graduate students to complete their preliminary language requirements and introductory course requirements subject to optional examination by the degree-granting institution.

CERTIFICATION

Inclusion in Personnel Record for Department of Agriculture Employees. To aid in effecting its promotion-from-within policy, the Department has provided (Personnel Circular No. 144, dated September 22, 1944) that Graduate School credits earned by its employees will be placed in official personnel files of the bureau and the Central Office of Personnel. Unless specifically requested by the employee that such action not be taken, the Graduate School will forward, upon completion of the courses or at the end of the year, two copies of the student's record, without cost to the employee, to the personnel officer of the administration, bureau or office in which the student is employed.

Certification on Request. Upon a student's written request, an informational record of his work at the Graduate School will be sent to him or to an organization designated by him. An official transcript of academic credit to be transferred to a college or university will be made only when the student has filed with the Graduate School a transcript of his previous academic work showing that he has met all requirements for admission to the level of the courses for which he registered.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT

Certified Statements of Accomplishment are offered in the fields of Accounting, Administrative Procedures, Agricultural Economics, Public Administration, and Statistics upon the student's completion of specified programs of study. For complete details see the outlined program in the Department concerned.

These statements are offered to encourage the student to complete a well-rounded approach to his chosen field of study or work, so that he may more competently discharge his present and prospective responsibilities as a public servant. Courses completed and the quality of accomplishment are recorded on the back of the statement which may be used as a personal record of achievement or a public record of qualification.

Regulations and Procedures

ADMISSION

Admission to resident courses in the Graduate School is open to all qualified employees in the Federal service, and to such other qualified individuals as facilities will permit.

VETERANS

Graduate School courses are available to veterans of World War II under the provisions of Public Laws 346 and 16. Registration for part-time study is charged against educational benefits only in the proportion that the number of semester hours bears to a full normal load.

Veterans intending to enroll in the Graduate School should apply as soon as possible to the Regional Office of the Veterans Administration for an official certificate showing the amount of educational benefits to which they are entitled. This letter of entitlement will be accepted by the Graduate School in lieu of tuition fees and charges for books and supplies.

In cases where an official certificate has not been received prior to the time of registration, the veteran will be required by the Graduate School to pay at least one half of his tuition plus whatever fees may be applicable, with the understanding that this will be refunded retroactive to the effective date on the letter of entitlement.

ENTRANCE REQUIREMENTS

Since the Graduate School does not offer degree programs, entrance requirements differ with the level of the course for which the student is registering.

COURSE PREREQUISITES

Undergraduate courses, in general, are open to persons who are graduates of a standard high school or equivalent or who qualify for the course because of satisfactory work experience. For admission to more advanced courses college work in the same or related field is specified or understood. For other courses definite prerequisites may be stated. Year courses require the completion of the work of the first semester or its equivalent.

COURSE LOAD

Students employed full time are not expected to carry more than two courses. Should they wish to register for an additional course, permission must be secured from the Registrar.

CLASSIFICATION OF COURSES

1. The courses of study offered are classified according to aim, amount of advancement, or subject matter.
2. According to amount of advancement, some courses are for undergraduates only, others for undergraduates of sufficient maturity or graduates, and still others for graduates alone.
3. Courses are numbered according to degree of advancement of the course: below 100, non-credit; 100-399, undergraduate; 400-699, graduate and advanced undergraduate (senior); above 699, graduate.
4. The value of the course in semester hours is given below the course title.

REGISTRATION REGULATIONS

Registration. Registration is during the periods scheduled in the School calendar, see inside front cover. Students will register in the School office, Room 1031 South Building, or in such other rooms as will be designated. Mail registration forms will be supplied on request. After October 3 in the fall semester, February 13 in the spring, and June 7 in the summer, students may enroll for credit only with the approval of the instructor and the Registrar. Registration is not completed until the required fees have been paid. When the limitation set for each course is reached, registration for that course is closed. The Graduate School reserves the right to cancel any course if registration does not warrant continuance.

Opening Date. The twenty-seventh year of the Graduate School opens Monday, September 22, 1947. All classes begin during the week starting on that date. The fall and spring semesters run fifteen weeks each and the summer session ten weeks. Spring semester classes begin on February 2 and the summer session on June 1.

ATTENDANCE AT CLASSES

Students are expected to attend all class sessions and not to absent themselves without adequate reason.

Absences do not relieve the student from responsibility for work required while he was absent, and the burden of proof that the work was done rests with the student. In courses in which the work cannot be satisfactorily tested by written examination, the instructor shall be the judge of the relation of the student's attendance or non-attendance to his grade. All auditors, and other students carrying

undergraduate courses who do not make up all required work, who are absent more than 25% of the class periods will receive a mark of "W," withdrawn.

WITHDRAWAL

Withdrawals are permitted only under justifiable circumstances. A student who is obliged to withdraw from the Graduate School or from a course must immediately notify the Registrar.

Withdrawal from a course or from the Graduate School, without academic or financial penalty, requires the permission of the Registrar. Permission to withdraw will not be granted to a student who does not have a clear financial record. Reporting the dropping of a course to an instructor does not effect its discontinuance.

CREDIT AND GRADES

Academic Credit. Persons registering for academic credit must satisfy all prerequisites for admission to the course as generally stated or specified in the course description.

Audit. An auditor must meet the same prerequisites as a credit student. He receives full privileges of class participation if he chooses to exercise them. An auditor does not receive a grade; he receives only a mark of AUD.

Grades. At the close of the semester students registering for credit receive written notice by mail of grades received.

TRANSFER OF CREDIT

An official transcript of academic credit earned at the Graduate School will be made for each student requesting it if he has filed with the Graduate School a transcript of his previous academic work. This must show that the student has met all requirements for admission to the level of the courses for which he registered and for which he wishes official certification.

FEES

Course Fees. In general, fees are computed at \$8.00 per semester hour credit for strictly undergraduate courses and \$9.00 per semester hour for graduate and advanced undergraduate courses.

Late Fee. There will be a \$1 late registration fee and a \$1 late transfer fee as shown in the School Calendar.

Laboratory Fee. Laboratory or materials fees are listed in the Schedule of Classes for each semester, in connection with the courses for which they are charged.

Transcript Fee. There will be a fee of 50¢ for each copy of a student's record on the regular Graduate School blank or on the blank of another institution or state board of education.

PAYMENT OF FEES

Fees are due and payable in advance at the time of registration. Registration is not complete and no student is permitted to attend classes until all fees have been paid.

In exceptional cases, subject to the approval of the Registrar, the student may sign a contract permitting payment of one-half of the fees at the time of registration plus a \$1.00 service charge and the balance on or before November 3 in the fall semester, March 15 in the spring semester and July 2 in the summer session.

A student who fails to meet payments when due, but who pays his fees within a week of the month in which payment is due, is charged a service fee of \$1.00. A student who fails to meet payments within a week of the month in which payment is due will be suspended and may not attend classes until he has been reinstated and has paid all accrued fees as well as a reinstatement fee of \$2.00.

All fees are payable at the Graduate School business office, Room 1031, South Building, United States Department of Agriculture.

WITHDRAWAL WITH REFUND OF FEES

Application for withdrawal or change in class schedule must be made in person at the Graduate School business office. Notification to an instructor is not acceptable notice. Since commitments for instruction and other arrangements are necessarily made in the beginning of the semester, no refund of fees can be made except as herein indicated.

Withdrawals with refunds are permissible under justifiable circumstances upon written request of the student made within the refund period for each term on or before: October 3 in the Fall semester, February 13 in the Spring semester and June 11 in the Summer session. When a student is granted permission to withdraw within this refund period, his fee minus a \$3.00 registration charge for each course will be refunded.

When a student is officially transferred out of the Washington area and he has been given permission to withdraw, his tuition fee, minus a \$3.00 registration charge for each course, will be refunded in the amount proportionate to the unexpired portion of the semester. No refund will be made of laboratory and other incidental fees. Written evidence of such transfer must be presented. Permission to withdraw with refund will not be granted in cases arising out of the student's voluntary action.

Adjustments in fees for students registered under Public Law 16 and Public Law 346, as amended, who withdraw officially by filing written application, will follow the graduated scale of charges given in Veterans Administration Circular No. 268, November 15, 1946.

All adjustments are made as of the date on which application for withdrawal with refund is received. In no case will tuition be reduced or refunded because of non-attendance in classes.

Authorization to withdraw and certification for work done will not be given to a student who does not have a clear financial record. Students withdrawing under request from the Graduate School are not entitled to any return of fees.

TEXTBOOKS

The Graduate School maintains a bookstore for the convenience of the students in Room 1041, South Agriculture Building. Due to the continued shortage of college textbooks, it is suggested that students purchase their books at the time of registration. The book store is open daily from 9:00 a.m. to 5:30 p.m. and until 6:20 p.m. during registration periods.

ROOM ASSIGNMENTS

Classroom assignments, insofar as practicable, will be given the student at the time of registration. A complete schedule of room assignments will be posted a week before the beginning of classes for each term on bulletin boards outside of Room 1031, and in the north entrances of the fourth and seventh wings, of the South Building, United States Department of Agriculture.

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The Graduate School reserves the right to cancel any course if registration does not warrant continuance; to change instructors; to make any changes deemed advisable in registration and in fees; and to require the withdrawal of any student at any time for such reasons as the School deems sufficient.

Department of Biological Sciences

DEPARTMENTAL COMMITTEE

ALBERT H. MOSEMAN, Ph.D., Assistant to the Chief of Bureau, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, USDA (Chairman)

HOWARD P. BARSS, M.S., Principal Botanist and Experiment Station Administrator, Office of Experiment Stations, Agricultural Research Administration, USDA

F. C. BISHOPP, Ph.D., Assistant Chief, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, USDA

EDWARD H. GRAHAM, Ph.D., Chief, Biology Division, Soil Conservation Service, USDA (Vice-chairman)

LESLIE A. SANDHOLZER, Ph.D., Bacteriologist, In Charge, Fishery Technological Laboratory, Fish and Wildlife Service, Department of Interior

BENJAMIN SCHWARTZ, Ph.D., Chief, Zoological Division, Bureau of Animal Industry, Agricultural Research Administration, USDA

WILLARD H. WRIGHT, Ph.D., Chief, Zoology Laboratory, National Institute of Health, U. S. Public Health Service, Federal Security Agency

R. Y. WINTERS, Ph.D., Research Coordinator, Agricultural Research Administration, USDA

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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In recent years noteworthy advances have been made in the knowledge of animal and plant breeding, human and animal nutrition, control of diseases and insects, soil fertility and management, and in related fields. The program of the Department of Biological Sciences is designed to meet, insofar as possible, the needs of Federal employees working in various fields of biological science: by keeping them informed of recent advances through seminar courses, by offering review courses, and by making available certain specialized undergraduate courses for which there is need within the Department of Agriculture and other agencies in the Federal service.

Within the past year a survey of all employees at the Department's Agricultural Research Center was made, by the Beltsville Graduate School Committee, to determine their educational needs and interests. The course program reflects the results of the survey. Some of the courses provide information basic to work in the biological sciences; the courses at the graduate level present information on recent advances in knowledge in the several fields. These latter courses are usually conducted on a seminar basis and provide for a maximum of discussion of new developments. The topics are presented by outstanding specialists from Federal and state research institutions.

110. General College Biology

Year, 4 credits each semester (alternate years)

HENRY W. OLSON

An introductory course, designed to acquaint the student with the relationships of animals to each other and to their environment. A study is made of life processes and the structural plans of several representative forms of each phyla, of the morphology, physiology, and development of the cell, of the principles of inheritance and evolutionary relationships. The course will consist of lectures, demonstrations and individual laboratory work.

The second semester is designed to acquaint the student with major principles of botany. The lectures, demonstrations, and individual laboratory work will include a brief survey of the plant kingdom, the study of the structure and life processes of the flowering plants, and the elements of plant physiology. With the use of the manual, the class will study the general identification of seed plants, in order to acquire familiarity with their distinguishing features and classification. The class meets in the Biology Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W.

[207] Land Management Ecology**World Agriculture**

(See p. 104)

Introduction to Farming

(See p. 93)

209. Systematic Botany*

Year, 2 credits each semester

SIDNEY F. BLAKE

Intended to give those with no previous experience in systematic botany an acquaintance with the elementary principles of the subject sufficient to enable them to use the ordinary manuals to advantage. The second semester is devoted to the identification of wild plants of this region by the use of a manual. One or two short field trips will be held.

[250.] Bacteriology

(1948-49 and alternate years)

HENRY W. OLSON

[320.] Human Physiology

(1948-49 and alternate years)

HENRY W. OLSON

200. Poultry Husbandry*

Fall, 2 credits

C. W. KNOX, H. R. BIRD and SPECIALISTS

A discussion of problems faced by owners of small flocks of poultry, including the purchase of chicks and of feed; the management, housing, and feeding of growing birds and laying hens; culling to maintain efficient production; protection of the health of the birds; maintenance of quality by proper handling; and preparation of poultry and eggs for home use.

201. Beekeeping

Fall, 2 credits. Repeated in Spring

W. J. NOLAN

A survey of the basic principles underlying modern beekeeping practice. Consideration will be given to the organization of the honeybee colony, bee behavior, apiary and honey-house equipment, types of honey-flows, honey-producing regions of the U. S., bee diseases, swarming, wintering, pre-honey-flow management, extracted and comb honey production, harvesting and storing honey, marketing, pollinating activity of the honeybee, bees-wax, queen rearing, package bees, races, and bee breeding. *Prerequisite:* Course in biology or consent of instructor. Prior experience with bees desirable but not essential.

* To be given at the Agricultural Research Center, Beltsville.

Home Gardening

(See p. 124)

213. Identification of Local Plants

Summer, 2 credits

JOSEPH EWAN

An elementary course, with no prerequisites, dealing with the process of determining the names of the plants, both wild and cultivated, trees, shrubs, herbs and wild flowers, of the vicinity of Washington, D. C. The work will include discussion of the books and keys to the plants, the language they are written in, and how to use them. Most of the work will be with actual plants, largely those brought in by the students or gathered on class field trips. Instruction and demonstration will be given in the methods of pressing, drying, and mounting plant specimens.

214. Birds of the Washington Area

Summer, 2 credits

CHANDLER S. ROBBINS

Introduction to birds of the District of Columbia region, stressing field identification, but touching on classification, distribution, migration, nesting, ecology and research methods. Museum collections of birds will be inspected and recordings of bird songs will be available in addition to the field trips.

Soil Conservation

(See p. 62)

Soil Fertility and Management

(See p. 62)

Soils: Their Morphology, Genesis, and Classification

(See p. 62)

[310.] Background and Development of Biological Sciences**[500.] Insect Morphology (1948-49 and alternate years)**

R. E. SNODGRASS

546. Advanced Insect Morphology

Fall, 2 credits

R. E. SNODGRASS

Emphasis on the internal construction of the insect. Major topics will be the alimentary canal, the respiratory and circulatory systems, the nervous system and sensory organs, and the finer details of the reproductive system. Lectures, a detailed notebook and collateral reading. *Prerequisite:* Insect Morphology or a course in biology, entomology or zoology.

[545.] Systematic Entomology (1948-49 and alternate years)

R. I. SAILER

512. Medical and Veterinary Entomology

Year, 2 credits each semester

F. C. BISHOPP

A timely general course in medical entomology with emphasis on the practical aspects of this important field. The biology, habits, and relation to disease of insects, spiders, mites, and ticks, are discussed. How these arthropods affect man and animals as intermediate hosts, or carriers of disease-producing organisms, is given attention and special consideration is given methods of control. The adaptation of known control procedures to present-day problems is considered. Features of the course include lectures by outstanding specialists in this general field and round-table discussions of practical problems. *Prerequisite:* Basic training in entomology or consent of instructor.

Writing for Official Purposes

(See p. 28)

Visual Presentation in Federal Information (See p. 28)

Design and Analysis of Complex Experiments (See p. 45)

Elementary Statistical Analysis (See p. 43)

Statistical Methods For Research Workers (See p. 46)

[600.] New Developments in Animal Breeding (1948-49)

603. Advances in Plant Breeding and Genetics*

Fall, 2 credits

F. J. STEVENSON and SPECIALISTS

A survey of recent developments in plant breeding and genetics: the utilization of hybrid vigor in crop improvement; new developments in breeding grasses and other forage crops; methods of selection for special characters; techniques for propagating plants in the greenhouse; the use of colchicine in producing polyploid types; and discussion of recent advances in knowledge of genetics of crop plants. The information will be presented by specialists in various fields and the lectures will be developed insofar as possible to meet the needs and interests of those who register for the course. *Prerequisite:* A course in the principles of genetics or consent of the instructor.

Agricultural Chemistry (See p. 59)

[518.] New Developments in Insecticides (1948-49)

M. C. GOLDSWORTHY and F. C. BISHOPP

[519.] New Developments in Fungicides (1948-49)

M. C. GOLDSWORTHY and F. C. BISHOPP

**Protecting Engineering and Scientific Developments
Through Patents** (See p. 120)

[608.] Recent Advances in Animal and Human Nutrition
(1948-49)

Advanced Organic Chemistry (See p. 59)

**609. Recent Developments in Plant Physiology and Plant
Nutrition***

Fall, 2 credits

F. P. CULLINAN and SPECIALISTS

Discussion of recent investigations in plant physiology and plant nutrition: photosynthesis; growth regulating substances; the effect of light intensity and quality and varying photoperiods on growth and reproduction behavior of plants; the mechanism of plant synthesis of organic compounds and plant nutrient absorption; the development and utilization of techniques for studying the nutrition of plants. *Prerequisite:* Basic training in plant physiology or related fields.

Management Responsibilities of the Administrative Scientist
(See p. 70)

Training Management (See p. 78)

Safety Engineering I: Technical Functions (See p. 77)

* To be given at the Agricultural Research Center, Beltsville.

Department of Languages and Literature

DEPARTMENTAL COMMITTEE

LESTER A. SCHLUP, B.C.S., Chief, Division of Extension Information, Extension Service, USDA (Chairman)

GEORGE E. BEAUCHAMP, Ph.D., Chief, Publications Control Unit, Bureau of the Budget
HARRY B. HUMPHREY, Ph.D., Principal Pathologist (ret.), Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, USDA

J. KENDALL McCLARREN, Head, Division of Information, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, USDA

M. C. MERRILL, Ph.D., Chief, Division of Publications, Office of Information, USDA
RALPH R. SHAW, M.S., Librarian, USDA (Vice-chairman)

ROBERT L. WEBSTER, M.S., Associate Director, Office of Information, USDA

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IMPORTANCE OF ENGLISH WRITING AND SPEECH

Among students preparing for technical careers and among busy people employed on the basis of their technical competence, there is an inevitable tendency to concentrate on subject-matter specialties, to the great neglect—if not exclusion—of the auxiliary subjects that can effectively implement such specialties. It is common knowledge in the Government service that nothing so much retards the progress of many young technicians, scientists, and other professional personnel as their inability to incorporate the results of their thinking and of their research in effective, concise, lucid English, written or oral. Technical knowledge is of no value unless it can be communicated to others. There are indeed few persons who cannot greatly benefit from the further sharpening of their tools of communication.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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ENGLISH AND LITERATURE

222^a. English Composition

Fall, 3 credits. Repeated in Spring and Summer

FRANCES H. MILLER

Equivalent of freshman English. An introductory course in writing and English usage, designed especially for those who need a course preparatory to more advanced English studies. Special attention given to the fundamental principles and mechanics of good writing—grammar, punctuation, spelling, diction, etc. Exercises in writing short and long themes and in studying, analyzing, and evaluating selected English prose texts.

222^b. English Composition

Spring, 3 credits

ROMAIN G. GREENE

Continuation of course 222^a above.**223. Descriptive English Grammar**

Fall, 2 credits. Repeated in Spring and Summer

SUSAN E. HARMAN
KATHRYN WARD

A course in the study of grammatical principles, stressing sentence structure and correct English form. Lectures on the history and development of inflectional and derivational forms. Exercises in diagramming and in analyzing examples of good and bad English.

51. College English for Foreign Students

Fall, non-credit. Repeated in Summer

HELEN W. WILLIAMS

A course in college English designed to meet the needs of students with a foreign-language background. Includes study of idiom and anomalous and difficult grammatical constructions; vocabulary; and practice in correct and fluent expression in writing and speaking.

118. Practical English Usage

Fall, 2 credits. Repeated in Spring and Summer

CHARLOTTE L. WHITE

This course enables students through practice to master the fundamentals of correct English. Troublesome problems of English usage, sentence structure, choice of words, style, and grammar, are studied as aids to clear and forceful writing of letters, memoranda, and reports.

119. Vocabulary Building*

Fall, 2 credits. Repeated in Spring and Summer

ROMAIN G. GREENE
KAY E. BECKER

Designed to help writers and speakers express ideas clearly and attractively. It embraces word study and selection, diacritical markings, synonyms and antonyms, prefixes and suffixes, usage exercises, and other means of developing a broad and useful command of words.

Government Letter Writing

(See p. 54)

224. Creative Writing

Fall, 2 credits. Repeated in Spring and Summer

DELIGHT WILLIAMSON HOLT
HELEN S. PRYOR

The purpose of this course is to acquaint the student with the basic problems of structure and style in the fields of fiction, verse, and drama. The material of the course is slanted toward the creative approach altogether rather than toward the journalistic. Work of the course will be divided between lectures on technique and discussion of the work of class members. Emphasis within the various creative fields will be determined by the expressed interests of the class, but every effort will be made to present an integrated view of the whole scope of creative writing—not only from an aesthetic but also from a practical technical standpoint. Problems of marketing and selling also will be considered. Thus, students will be equipped to understand their profession as a whole, as well as the chosen phase of it which constitutes their field of special interest. The course will prove a quick, up-to-the-minute brush-up for those who have done some writing, whether for pleasure only or for publication, and who feel the need of refreshing themselves on fundamentals before resuming their creative activities. *Prerequisite:* English Composition or equivalent or permission of the instructor.

* A section to be given at the Agricultural Research Center, Beltsville.

400. Advanced Writing Seminar

Spring, 2 credits

DELIGHT WILLIAMSON HOLT

This course will consist entirely of open forum discussion of the work of class members. Students will work on projects of their own choosing in any phase of creative writing in which they are interested. *Prerequisite:* Creative Writing or equivalent or permission of the instructor.

330. Great Books

Year, 2 credits each semester *

IOLA SCOFIELD

Group discussion, under leadership, of important works in poetry, history, philosophy and criticism. The leader will try to help with the reading and understanding, but the books themselves will be the teachers. The intention of the course is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The only qualifications required are an interest in ideas and belief in free discussion. With few exceptions the books will be read in their entirety. One, two, or three meetings will be given to a book depending upon its length. The following books will be read:

Fall Semester: Sophocles, *Oedipus Rex*, *Antigone*; Aeschylus, *Oresteia*; Thucydides, *History of the Peloponnesian War*; Plato, *The Republic*; Lucretius, *On the Nature of Things*; Virgil, *Aeneid*; Tacitus, *History*; Marcus Aurelius, *Meditations*; Augustine, *Confessions*.
Spring Semester: Dante, *The Divine Comedy*; Machiavelli, *The Prince*; Shakespeare, *Learn*; Cervantes, *Don Quixote*; Bacon, *Novum Organum*; Hobbes, *Leviathan*; Rousseau, *The Social Contract*; Swift, *Gulliver's Travels*; Kant, *The Metaphysic of Ethics*.

Reading lists with definite assignments will be available at the time of registration.

340. Trends in Contemporary Literature

Summer, 2 credits

DELIGHT WILLIAMSON HOLT

Analyzes dominant tendencies in contemporary literature, that is, literature between the two World Wars, examining historic origins of these trends; the evolution of our thought patterns; the influence of social, economic and political developments; and general and individual stylistic tendencies. Reading assignments in fiction and in non-fiction will be made. Attention will be focused on the American literary scene, but a few significant works by foreign authors which have been written in or translated into English will be considered. Students will, through direction, develop a sense of literary style and a fuller understanding of human nature in terms of the forces it reacts to, and how and why it reacts. In addition to reading and class discussion, work of the course will consist of written reports and reviews.

SPEECH

COMMITTEE ON SPEECH

GEORGE E. BEAUCHAMP (Chairman)

WALTER B. EMERY, Ph.D., Attorney, Federal Communications Commission

HESTER B. PROVENSEN, LL.B., Assistant Professor, Department of Speech, University of Maryland

228. Fundamentals of Speech

Fall, 2 credits

MARY E. MOHLER

Through the preparation and delivery of short original speeches the student gains poise, assurance, and the ability to express himself clearly and accurately. Strict adherence to time limit quickens mental processes and develops discrim-

* Students may attend both semesters or either semester.

ination in the selection of speech material. Voice, articulation, and pronunciation drills. Posture, movement, and gesture. Learn to speak by speaking at each class meeting. Constructive criticism.

229. Effective Speaking*

Spring, 2 credits. Repeated in Summer

MARY E. MOHLER

Theory and practice of effective speaking through: (1) audience analysis, (2) organization of speech material to achieve a specific response, (3) delivering speeches for special occasions (radio, good will, welcome, presentation, acceptance, etc.), (4) planning an interesting and dramatic meeting, (5) officiating at banquets. Each student speaks at every class meeting. It is assumed that the student has some knowledge or experience in speech making.

400. Advanced Public Speaking

Spring, 2 credits

GEORGE E. BEAUCHAMP

A course designed for persons who have previously had a beginning course or some practical experience in public speaking. Special attention is given to organization of speeches, types of speeches, and effective delivery.

232. Voice and Remedial Speech

Fall, 2 credits. Repeated in Spring and Summer

WALTER B. EMERY

Study and intensive drills in voice production, flexibility, range, articulation, and enunciation. Training and practice are designed to improve vocal conditions for all speech purposes and to remedy minor speech difficulties. In order that students may receive more individual attention, registration is limited to twenty.

This course is intended to improve the normal voice and minor speech difficulties. Prospective students with major speech difficulties are urged to enroll in the Speech Clinic.

50. Speech Clinic

Fall, non-credit. Repeated in Spring and Summer

WALTER B. EMERY

A speech clinic has been organized as a service to Graduate School students. The clinic is designed to help correct serious abnormal speech disorders. Private consultation and practice with instructor 20 minutes per week for 15 weeks. Schedule of evening or Saturday appointments to be arranged with the instructor. Limited to 8 students.

305. Radio and the Human Voice

Spring, 2 credits

E. J. ROWELL

Recordings are being used to supplement pictures as a part of family records and as a means of exchanging greetings. What is a good radio voice?

This course is designed for those who are interested in broadcasting the human voice, pointing up the desirable qualities which make for radio broadcasting. A condensed study of our two languages, that for the ear and that for the eye, will be made. Exercises in voice control, microphone techniques, and practice recordings for business and pleasure will be provided.

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PRESENTATION METHODS

Primitive man usually communicated with his fellow tribesmen through the spoken word. Today we would be limited indeed if

* A section to be given at the Agricultural Research Center, Beltsville.

our only method of communication were the spoken word. Fortunately we have many methods of communication at our disposal, both for pleasure and for business. Special techniques have been developed for each method, each of which has proved to be successful in presenting information and knowledge about certain subjects to particular groups or individuals.

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320. Introduction to Public Information Media

Fall, 2 credits. Repeated in Spring

RICHARD FITZPATRICK

Presenting to the public current, accurate, objective information is essential in democratic government. The course will include a review of the interrelation of public opinion, public interest and public information; the importance, potentialities and issues of mass communication; evaluation of the use and effectiveness of newspapers, magazines, books, radio, facsimile, television, motion pictures, and advertising as channels of public information; limitations on the effectiveness of mass media; propaganda and censorship; and mass communication in the international field. Opportunities in public information as a profession will be discussed. *Prerequisite:* Background in any social science or practical experience in editorial or informational work.

225. Editing

Year, 3 credits each semester
Limited to 40 students.

M. C. MERRILL and SPECIALISTS

Intended primarily for those seeking information on editorial techniques involved in handling manuscripts after they leave the author's hands and until they are issued in printed form. Discussion of the fundamental principles of editing, including the organization or rearrangement of material for effective presentation; rhetorical style in relation to subject matter; word forms, sentence structure and effective use of English; considerations governing titles, tables of contents, headings, footnotes, illustrations, literature citations and bibliographies, and statistical checking; the principles of table formation and arrangement; the relation of type to subject matter and the techniques of printing; and the fundamentals of indexing and proofreading. Practical examples of editorial work are discussed in class. Drill is afforded in the use of the Style Manual of the Government Printing Office. Opportunity is provided for a trip through the Government Printing Office to note and study operations. Note: Persons who are engaged in any phase of editorial work or who have completed the course in Editing in previous years may enroll for the second semester if there are any vacancies.

200. Readable Writing

Spring, 2 credits

AMY G. COWING and HARRY MILEHAM

There is increased interest in writing material so that people will find it appealing and easy to read, because much writing is, and has been, too hard for most people to read.

This course will teach you how to write so that more people will read and understand your articles and bulletins; how to estimate how easy or hard the reader will find your writing; how to organize your writing for easy reading. It will also deal briefly with the use of pictures and other visual aids to reading. Much of the course will center around use of the Flesch Readability Formula and will consist of lectures and workshop sessions in which students will make practical application of writing principles.

226^a. Writing for Official Purposes

Fall, 2 credits

J. KENDALL McCLARREN and SPECIALISTS

How to present facts and ideas in official writing is the problem of this course. Every type of writing has its own requirements. Official writing, though like other writing in most respects, has important peculiarities. For example, it must respect the boundaries of science, of governmental organization, and of official policy. Frequently the attempt to do so makes it wordy, wooden, and lifeless. The course, which presupposes some writing experience, considers ways of making government writings clear, vigorous, and readable in spite of the necessary rules and restrictions. It shows where the limitations do not apply, as well as where they do, so that all possible freedom may be developed. One major writing project is required to earn credit for the course.

226^b. Writing for Official Purposes

Spring, 2 credits

J. KENDALL McCLARREN and SPECIALISTS

This course will present informally the elements of popular writing on scientific and technical subjects, with special attention to the requirements of newspapers and general magazines. The seminar method will be followed as far as practicable, and as much practice in actual preparation of copy as possible will be given. *Prerequisite:* First semester or consent of instructor.

245. Radio Script Writing

Fall, 2 credits

BERNARD W. MOLOHON

Nearly everyone has occasion to appear on the radio. Only a very few of the professionals can ad lib their way through a show; amateurs should seldom try, but should have a prepared script. What constitutes a good script? This course is designed to show how to write scripts: what should go into a talk, an interview, a round-table discussion, dramatic or semi-dramatic shows; their format, including the use of sound effects. Recordings of professional shows will be used in demonstrations.

350. Effective Meetings

Spring, 2 credits

DOUGLAS ENSMINGER and J. L. BOATMAN

What makes a meeting successful? Why have a meeting? How to hold an effective meeting? This course will give students the answer to these and other questions dealing with the conduct of meetings. Special attention will be given to the cultural and psychological factors in group activity. Opportunity will be given students to put the principles taught into actual practice under supervision. This course will be of value to all persons interested in group relationships, including rural and civic groups of all kinds and with day to day agency administration and inter-agency cooperation.

240. Visual Presentation in Federal Information Work

Fall, 2 credits

R. L. WEBSTER and SPECIALISTS

Increasing use is being made of different types of visual media in presenting information. This course is designed to describe the common visual media; to indicate where they may be used; and to describe how each may be effectively integrated with the information phase of operating programs.

The individual media to be reviewed will include motion pictures, exhibits, demonstrations, slide films, slide series, still photographs, charts, posters and models. The history of visual presentation activity in the Federal Government will be reviewed. Attention will be given to production and distribution problems. However, emphasis will be on utilization principles and problems, and the integration of visual with other media methods for achieving greater use of visual materials within normal Federal budget limits. The course is intended primarily for information workers, but will be useful as background for subject matter specialists and junior executives.

120. Indexing

Fall, 1 credit

MABEL H. DOYLE and MARY A. BRADLEY

This course is intended primarily for those interested in making indexes for periodicals, bulletins, reports, and books. Emphasis will be placed on general procedures and matters of policy as well as on basic principles and techniques. Specific types of indexing adapted to various subjects and popular style, contrasted with technical and scientific styles, will be studied. Examples of different kinds of indexes will be shown and opportunity given for practical work in the preparation of indexes, including the making of cross references, alphabetizing, and editorial preparation of index cards and manuscripts for the printer.

237. Government Printing Procedure

Fall, 2 credits. Repeated in Spring

LOUIS H. ANDERSON

Intended for those who plan, prepare, or procure printing, duplicating, and distribution of books, pamphlets, folders, posters, charts, forms and other printed or duplicated matter. Subjects covered include: analysis of manuscript copy and its purpose to determine format and method of production; organization of copy for effectiveness; copy fitting and measuring; ways to aid the reader to grasp the message of the printed word; legibility and readability; type faces and typography; illustrations; printing and duplicating processes and criteria for their use; paper; binding methods; preparation of copy for duplicator and printer; handling of proofs; specifications and cost factors; and channels and methods of distribution of Government publications. The knowledge of methods and procedures to be acquired from this course is intended to give the student competence and confidence in dealing with author and editor, and printing, duplicating and distribution technicians.

43. Personal Development

Fall, non-credit. Repeated in Spring

HESTER H. GALVIN

HESTER B. PROVENSEN

Discovery and development of potentialities of each student. Poise, confidence, appearance, make-up, dress and color sense, art of conversation, and cultivation of wider range of interest and curiosity. Actual social situations created and discussed. Conferences, guest speakers.

FOREIGN LANGUAGES

The events of World War II and the unprecedented expansion of all kinds of international activities have greatly increased interest in nearly all foreign languages. Research workers, those employed in all aspects of international relations, and those scheduled for foreign assignments are in need of foreign-language instruction. With the expansion of international land, water and air transportation many persons will want to improve their facility of speech in some foreign language before visiting our world neighbors.

The Graduate School provides opportunities for instruction in a wide range of foreign languages. It is the aim of those responsible for these courses to conduct them so as to develop in their students a ready and intelligent use of the language. The person who is seeking the maximum practical value from a foreign language must learn not only to translate it but to think in it well enough for translation to be unnecessary. He should acquire a spoken command of at least one language other than his own.

INTENSIVE LANGUAGE PROGRAM

World War II furnished much new experience in the teaching of foreign languages. The Intensive Language Program of the American Council of Learned Societies, working with the armed forces, developed a rapid and efficient system of teaching languages. Through the method developed by that Program a student is able to speak the language fluently in a relatively short period. For French and Spanish a good start can be acquired in four to six weeks. Nine months is sufficient to complete control of the structure of even the esoteric languages, though fluency in these may require a longer period of instruction.

Team teaching is the secret. Under this type of intensive instruction, the student learns through listening and imitating a native speaker; the whole process being directed by a trained linguistic scientist who is a specialist in the language. The student learns to speak before learning to write. He spends four to six hours each day with the instructor or the drill-master. Phonograph records are used as supplementary teaching material.

This type of intensive instruction now has been incorporated into the regular curriculum at Brown University, Cornell University, University of Michigan, Yale University and other leading universities.

In addition to the standard type of language training program offered each semester, the Graduate School, in cooperation with the Foreign Service Institute of the Department of State, now offers opportunities in this new method of intensive language instruction. This should be of particular interest to those Federal employees who must acquire competence in a language in a short period of time.

Two types of such opportunity are available at the Graduate School: (a) courses given on official time and (b) courses given outside working hours. In all these, those who enroll are expected to spend a minimum of four hours and a maximum of eight hours each day for four weeks and upward, depending on the language. Classes are limited to eight students.

a. Courses given on official time

The Department of State is authorized to provide language training, through the Foreign Service Institute, for Federal employees who are certified by their agencies as requiring language training to perform necessary duties in connection with definite foreign assignments. Upon written certification by the agency, official arrangements may be made to place such persons in one of the regular intensive language classes offered by the Foreign Service

Institute, depending upon the availability of facilities. Such training will be given on official time at no cost to the student. Department of Agriculture employees may secure information about this program from the Registrar. Persons from other Departments may secure information from the Registrar or directly from Dr. Henry Lee Smith, Jr., Foreign Service Institute, Department of State, Ext. 3260.

b. Courses given outside working hours

When facilities are available and when a group of six to eight persons can arrange their schedules appropriately special intensive classes in any language will be organized. Persons applying for such classes must be prepared to spend four to six hours a day, five days each week for a period of four to six weeks. Members of the staff of the Language Training School, Foreign Service Institute, will supervise these courses within the limits of their available time, and will cooperate with the Graduate School in their establishment and administration. Persons wishing to enroll in such a class should indicate their interest to the Registrar.

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Unless otherwise specified, all foreign language courses are organized as follows:

Elementary year—foundation work in grammar, vocabulary, reading, and translation, with some conversation.

Intermediate year—grammar review, more difficult reading and translation, use of idioms, writing and discussion in the language.

Conversation—development of facility in discussion and reading, use of idioms, writing and thinking in the language without translating.

Note: Course numbers followed by (a) are first-half of that course, or by (b) are second-half.

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DIRECTED LANGUAGE STUDY

In some languages and in specialized scientific fields, enrollment is insufficient to justify offering instruction on a regular basis. If fifteen or more students inform the Graduate School office of their wish to take advanced work in a language, a class may be organized in which students will proceed with their study on an individual basis under the instruction of a teacher who will guide their study.

ARABIC, CHINESE, CZECH, DUTCH, GREEK, HINDU, JAPANESE, MALAY,
POLISH, PORTUGUESE

Groups of students desiring instruction in any one of these languages are requested to notify the Graduate School of their interest. If a sufficient number are interested, an instructor will be secured and all necessary arrangements made to offer the course.

FRENCH

253^a. Elementary French

Fall, 3 credits. Repeated in Spring

HARRY B. HUMPHREY
JOHN DE NOIA**253^b. Elementary French**

Spring, 3 credits. Repeated in Summer

HARRY B. HUMPHREY
JOHN DE NOIA**254^a. Intermediate French**

Fall, 3 credits

HARRY B. HUMPHREY

254^b. Intermediate French

Spring, 3 credits

HARRY B. HUMPHREY

255^a. Conversational French

Fall, 3 credits

ERIC GIVEN

255^b. Conversational French

Spring, 3 credits

ERIC GIVEN

GERMAN

259^a. Elementary German

Fall, 3 credits. Repeated in Spring and Summer

MARIANNE LEDERER
JOSEPH PONTI**259^b. Elementary German**

Fall, 3 credits. Repeated in Spring and Summer

MARIANNE LEDERER
JOSEPH PONTI**260^a. Intermediate German**

Fall, 3 credits

MAX LEDERER

260^b. Intermediate German

Spring, 3 credits

MAX LEDERER

261^a. Conversational German

Fall, 3 credits

MAGNA E. BAUER

ITALIAN

270^a. Elementary Italian

Fall, 3 credits

JOHN ROSSETTI

270^b. Elementary Italian

Spring, 3 credits

JOHN ROSSETTI

271^a. Intermediate Italian

Fall, 3 credits

JOHN ROSSETTI

271^b. Intermediate Italian

Spring, 3 credits

JOHN ROSSETTI

RUSSIAN

295^a. Elementary Russian

Fall, 3 credits. Repeated in Spring and Summer

PETER P. LAPIKEN
ERIC T. SCHULER
EUGENIA TARAKUS

295^b. Elementary Russian

Fall, 3 credits. Repeated in Spring and Summer

PETER P. LAPIKEN
ERIC T. SCHULER
EUGENIA TARAKUS

296^a. Intermediate Russian

Fall, 3 credits

GEORGE M. SAHAROV

296^b. Intermediate Russian

Spring, 3 credits

GEORGE M. SAHAROV

[299.] Advanced Russian

GEORGE M. SAHAROV

297^a. Conversational Russian

Fall, 3 credits

GEORGE M. SAHAROV

297^b. Conversational Russian

Spring, 3 credits

GEORGE M. SAHAROV

Modern Russia

(See p. 105)

46. Everyday Russian

Summer, non-credit

GEORGE M. SAHAROV

Accuracy and facility in the use of oral Russian will be attempted through use of dictation, conversation, and other devices. The work will be adapted to those entering the course. The course is designed especially for those who wish to acquire fluency in the spoken language of today. *Prerequisite:* One year of Russian.

SPANISH

300^a. Elementary Spanish

Fall, 3 credits. Repeated in Spring and Summer

CONSUELO BATISTA
ERWIN JAFFE
GLORINA PANIAGUA

300^b. Elementary Spanish

Fall, 3 credits. Repeated in Spring and Summer

CONSUELO BATISTA
ERWIN JAFFE
GLORINA PANIAGUA
BALLINA G. MEDRANO DE SUPERVIA

301^a. Intermediate Spanish

Fall, 3 credits

ARTHUR C. PARSONS

301^b. Intermediate Spanish

Spring, 3 credits

ARTHUR C. PARSONS

302^a. Spanish Conversation and Literature

Fall, 2 credits

RAFAEL SUPERVIA

302^b. Spanish Conversation and Literature

Spring, 2 credits

RAFAEL SUPERVIA

[304.] Commercial Spanish**574^a. Advanced Spanish Conversation**

Fall, 2 credits

BALLINA G. MEDRANO DE SUPERVIA

Limited to students with four years of Spanish, including a course in conversation or its equivalent.

574^b. Advanced Spanish Conversation

Spring, 2 credits

BALLINA G. MEDRANO DE SUPERVIA

47. Everyday Spanish

Summer, non-credit

RAFAEL SUPERVIA

Accuracy and facility in the use of oral Spanish will be attempted through the use of dictation, conversation, and other devices. The work will be adapted to those entering the course. The course is designed especially for those who wish to acquire fluency in the spoken language of today. *Prerequisite:* One year of Spanish.

La America Latina y los Estados Unidos

(See p. 113)

World Politics

(See p. 103)

Department of Mathematics and Statistics

DEPARTMENTAL COMMITTEE

W. EDWARDS DEMING, Ph.D., Adviser in Sampling, Bureau of the Budget (Chairman)

ALVA E. BRANDT, Ph.D., Statistical Consultant to Technical Director, Naval Ordnance Laboratory, Navy Department

JOHN H. CURTISS, Ph.D., Statistical Assistant to the Director, National Bureau of Standards, Department of Commerce

M. A. GIRSHICK, Ph.D., Principal Statistician, Bureau of the Census, Department of Commerce

MORRIS H. HANSEN, M.A., Statistical Assistant to the Director, Bureau of the Census, Department of Commerce

PHILIP M. HAUSER, Ph.D., Professor of Sociology, University of Chicago

B. R. STAUBER, M.A., Chief, Division of Agricultural Price Statistics, Bureau of Agricultural Economics, USDA (Vice-chairman)

O. C. STINE, Ph.D., Assistant Chief for Prices and Marketing, Bureau of Agricultural Economics, USDA

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THE STATISTICIAN AND HIS EDUCATION

Unprecedented dependence is being placed on statisticians by administrative officials in government and private business all over the world. There is an increasing appreciation of the importance and the possibility of possessing information of measurable reliability as a basis for making decisions. The statistician, through his specialized training, is able to provide current and comprehensive information on many subjects, and to do so with speed and economy.

Competent statisticians are accordingly in great demand, in government, business, and for teaching positions in the universities; the demand will exceed the anticipated supply for many years. The making of a statistician is a long and exacting process—several years of graduate study, plus at least a year and a half of high-grade experience under competent leadership. Educational facilities are strained, not only because of the heavy and increasing demand but also because the educational requirements placed on the statistician today are of an entirely different order of magnitude than they were a few years ago.

The opportunities offered in Washington for statistical education are unsurpassed, particularly with regard to work-experience and theory of modern sample-design. The advanced courses offered by the Graduate School are intended to supplement the statistical studies obtainable in universities. Further supplementation is provided through the internship plan (see page 37), by which practical experience in all aspects of sampling can be gained along with theory.

Statistical training is recognized as a necessary adjunct in such fields as engineering, biology, agricultural science, business, sociol-

ogy, economics, public opinion, and other branches of the natural and social sciences. Training in these professions is now regarded as incomplete without mathematical and statistical studies, through intermediate grades at least. Courses are offered by the Graduate School to provide this kind of training.

The statistician is particularly equipped by training and experience to assist in the formulation of scientific courses of action in government, manufacturing, and distribution. He must know when data are needed and how much precision is required, and what the cost should be. He is expected to be expert in the collection, analysis, interpretation, and presentation of quantitative information. He may be called upon to administer a statistical organization. He must therefore be familiar with problems of classification and definition. He is expected to be expert in the design of questionnaires and sampling procedures, and must therefore know field-work and costs. The courses described on the following pages accordingly provide training not only in theoretical principles, but training also in the administrative and research uses of data, as well as in the collection and processing of data and in the development and supervision of the minor skills necessary for carrying out statistical work.

In the design of a survey the statistician is concerned with the reliability and the cost of the figures that are to be obtained. Reliability is affected by many sources of error, which can be classified under two groups: (a) biases that are common to both complete counts and samples; (b) sampling errors. A thorough understanding of both types of error is essential in the work of the statistician. The statistical courses listed on the following pages deal mainly but not entirely with sampling errors. Proficiency in one or another branch of subject-matter such as sociology, economics, agricultural science, engineering, or some other specialized field, is essential for a full appreciation of the first type of error and for that reason collateral studies in one or more fields of science are advised and in fact are insisted upon in work leading to a Certified Statement of Accomplishment in Statistics.

OUTSIDE LECTURERS

The Graduate School has made a practice of bringing one or two outside leaders in statistical thinking to Washington annually. In the past, the following eminent authorities have lectured here: R. A. Fisher, John Wishart, Walter A. Shewhart, J. Neyman, Frank Yates, Harold Hotelling, Harold Jeffreys, and P. C. Mahalanobis. Some of these lectures are available in print; see the list of publications on the back cover.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN STATISTICS

A Certified Statement of Accomplishment is offered in each of three fields of statistical study—fields representing areas of statistical preparation and application most useful in the public service. The required program in each field is outlined on page 38. The student who completes the basic courses and earns 24 credits in specialized courses listed in any column, with substitutions only as specifically approved, is eligible to receive a Certified Statement of Accomplishment. It certifies that the student has completed a program of study which, in conjunction with collateral training in a subject-matter field of application, prepares him for effective public service in a particular statistical field.

INTERNSHIPS IN SAMPLING

In recognition of the shortage of statisticians with thorough theoretical training and with experience in large-scale statistical projects under competent leadership, and in recognition of the exceptional facilities in Washington for specialized training in this field, the Graduate School has undertaken to present to qualified students the opportunity to pursue their studies under a system of internships. Under this program a limited number of people with the necessary background will have a unique opportunity to combine advanced study with practical experience in sampling. Advanced candidates (Groups a and b below) will undertake a program of approximately a year and a half in duration, consisting in part of theoretical training and in part of work-experience. Candidates in Group c will require a longer period. The program will be planned on an individual basis, depending upon the work, training, and interests of the candidate. These internships carry no stipends.

The internships are intended to supplement, not supplant, work offered in universities. The program provides splendid opportunity for graduate students to do research work under leading authorities. The internships are open to three groups:

- a. those who have received their doctorates in mathematical statistics or have completed most of the courses necessary therefor;
- b. those who have received their doctorates or have completed most of the work necessary therefor in some sister profession such as agricultural science, economics, sociology, social psychology, engineering, etc.;
- c. those who cannot meet the above requirements and who must acquire a large part of their classroom training while engaged on the internship program.

COURSES LEADING TO CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN STATISTICS

With Concentration in One of the Following Fields of Application

THE SOCIAL SCIENCES

- 102. Algebra
- 103. Plane Trigonometry and Analytic Geometry
- 127. Elementary Statistical Analysis
- 206. Calculus
- 520. Statistics of the Federal Government
- 726. Interpretation of Statistical Calculations
- 735. Theory of Sample Surveys
- 717. Interview Survey Techniques in the Social Sciences
- 734. Statistical Methods for Research Workers
- 738. Introduction to Sampling and Statistical Inference
- 753. Modern Developments in Statistical Economics

THE NATURAL SCIENCES

- 102. Algebra
- 103. Plane Trigonometry and Analytic Geometry
- 206. Calculus
- 127. Elementary Statistical Analysis

MATHEMATICS

BASIC COURSES—Required of all candidates

SPECIALIZED COURSES

- 206. Calculus
- 600. Statistical Analysis in Industrial Research
- 704. Interpolation, Approximation, and Mechanical Quadrature
- 723. Design and Analysis of Complex Experiments
- 725. Interpretation of Statistical Calculations
- 731. Least Squares and Curve Fitting
- 734. Statistical Methods for Research Workers
- 738. Introduction to Sampling and Statistical Inference
- 749. Control of Quality by Statistical Methods
- 500. Advanced Calculus
- 600. Statistical Analysis in Industrial Research
- 708. Linear Algebra
- 712. Theory of Functions
- 723. Design and Analysis of Complex Experiments
- 735. Theory of Sample Surveys
- 739. Multivariate Analysis
- 740. Advanced Analysis of Variance
- 741. Theory and Application of the Characteristic Function
- 751. Theory of Measure
- 752. Advanced Theory of Probability

ELECTIVE COURSES

- 500. Advanced Calculus
- 502. Differential Equations
- 704. Interpolation, Approximation, and Mechanical Quadrature
- 712. Theory of Functions
- 709. Theory of Infinite Processes
- 732. Sampling in Social and Economic Surveys
- 733. Theory of Sampling
- 741. Theory and Application of the Characteristic Function
- 752. Advanced Theory of Probability

The internship will consist of two integrated parts:

1. Classroom training in courses at the Graduate School, or at other educational institutions in the city. This training will be planned to strengthen previous training and to fill gaps.
2. Work experience in government agencies on large-scale statistical sampling and testing programs. The work in the social sciences will consist of assistance in the preparation of questionnaires and sampling plans; development, application, and testing of new theory; writing instructions for use in the field, in the office, and for tabulation; computation of sampling errors; computation of costs; and actual experience in interviewing. Every intern and his program must be approved by the agency to which he is assigned.

Included among the agencies to which interns will be assigned are:

Bureau of Agricultural Economics	Bureau of the Census
Bureau of the Budget	Bureau of Labor Statistics
	National Bureau of Standards

Opportunity will be given for actual field experience. Holders of internships in industrial statistics will take part in the development of the necessary statistical theory and in experimental design, and will have the opportunity of becoming familiar with actual testing practice and the development of new methods.

This program is under the immediate direction of a Committee on Internships in Sampling. The committee is composed of:

W. EDWARDS DEMING (Chairman)	MORRIS H. HANSEN
W. F. CALLANDER, Assistant Chief for Agricultural Statistics, Bureau of Agricultural Economics, USDA	ARYNESS JOY WICKENS, Assistant Com- missioner, Bureau of Labor Sta- tistics, Department of Labor
WILLIAM G. COCHRAN, Professor of Statistics, Institute of Statistics, University of North Carolina	FREDERICK F. STEPHAN, Professor of Sociology and Statistics, Cornell University

Each application will be reviewed and approved or rejected by this Committee. The Committee will help the intern plan his program and will consult with him from time to time concerning his progress. The Committee will keep the university informed of progress, where the intern program is being developed as a research project.

Upon satisfactory completion of the internship the individual will be awarded by the Graduate School a certified statement appropriately descriptive of the nature, extent, and quality of the

training and work experience. In the case of pre-doctorate candidates credit will be transferable under arrangements worked out in advance with the institution in which the intern is a candidate for a degree. In certain cases this work may be used, with the approval and cooperation of the degree-granting institution, as the doctoral thesis or as the basis for it.

Applications should be made to the Director of the Graduate School and should include the following information:

- | | |
|--|---|
| (1) Name | (5) Fields of specific interest and |
| (2) Date and place of birth | circumstances surrounding |
| (3) Previous academic work | application (i.e., purpose, |
| (4) Citations or copies of publi-
cations or technical papers | whether applicant would de-
vote full time to internship,
etc.) |

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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MATHEMATICS

In the modern world mathematics plays an important part; it furnishes the background for much of the fundamental research and the application of this research in physics, engineering, chemistry, economics, statistics and other branches of the natural and social sciences. The program in Mathematics is designed to provide courses which will enable students to do further work in the natural and social sciences and to pursue studies in applied mathematics. Courses in advanced vector analysis, tensors, differential geometry, theory of groups, theory of electronic calculators, and others as well, will be added in the near future.

1. Review of Freshman Mathematics

Fall, non-credit. Repeated in Summer

EMIL SCHELL

A review course on the level of freshman mathematics. Algebra, trigonometry, analytic geometry. A brief introduction to the methods of the differential calculus. Emphasis on applications to statistical problems. *Prerequisite*: One year of college mathematics.

2. Review of Calculus

Fall, non-credit. Repeated in Summer

H. BURKE HORTON

Variables, functions, limits, divided differences, derivatives, application of derivatives to geometry, engineering curve fitting and analysis. Transcendental functions, polar equations, differentials, mean value theorem, techniques of integration and engineering application. Series and expansion of functions. *Prerequisite*: Calculus.

102. Algebra

Fall, 3 credits. Repeated in Summer

JOSEPH S. RHODES

Fundamental rules of algebra; exponents; logarithms; manipulations with proportions; identities and conditions; solution of equations; binomial theorem; numerical approximations. Uses of symbolic operators. Determinants; solution of equations by the reciprocal matrix. Theory of equations; progression; series. Permutations and combinations. Graphical methods. Emphasis on applications to statistics and the physical sciences. *Prerequisite:* High school algebra and plane and solid geometry.

103. Plane Trigonometry and Analytic Geometry

Spring, 3 credits

JOSEPH S. RHODES

Trigonometric equations and identities; radian measure; inverse trigonometric functions; polar coordinates, complex numbers, De Moivre's theorem.

Coordinate systems; coordinate geometry of two dimensions; loci; systematic study of the straight line, the circle, conic sections, the general equation of second degree; polar coordinates; parametric equations; brief introduction to coordinate geometry of three dimensions. *Prerequisite:* College Algebra.

206. Calculus

Year, 3 credits each semester

E. J. FINAN

First semester. Variables, functions, limits, continuity, divided differences, derivatives. Application of the derivative to geometry, physics, curve fitting, and analysis. Mean value theorem. The anti-derivative. Riemann integration. *Prerequisite:* Algebra and trigonometry and analytic geometry.

Second semester. Standard integral forms. Partial and total derivatives. Constrained maxima and minima in two variables; Lagrange multipliers. Interpolation. Taylor's series with one, two, and three variables. Propagation of errors. Series. Multiple integrals. Line integrals. Approximate integration; the Euler-Maclaurin formula for integration and summation. History and application stressed. *Prerequisite:* First semester or equivalent.

307. Survey of College Mathematics

Spring, 3 credits

EMIL SCHELL

A course covering the ideas and methods of modern mathematics, designed for students who wish to unify their mathematical training. Subjects treated consist of the theory of numbers, the number system, geometrical constructions, projective geometry, topology, functions, and limits. Emphasis will be placed upon the content and purpose of mathematical learning by appropriate illustrations from various fields. Text: Courant and Robbins, *What is Mathematics?* (Oxford, 1941). *Prerequisite:* Calculus, or consent of the instructor.

[500.] **Advanced Calculus** (1948-49 and every third year)

RICHARD K. COOK

[700.] **Vector Analysis** (1948-49 and every third year)

Physics of the Upper Atmosphere

(See p. 64)

Introduction to Modern Physics

(See p. 65)

502. Differential Equations

Year, 3 credits each semester (every third year)

RICHARD K. COOK

Will cover ordinary and partial differential equations with application to physics, economics, and statistics. Solution in series, leading to Bessel functions and other series. Graphical and numerical solutions to ordinary differential equations. Calculus will be reviewed as necessary. *Prerequisite:* Calculus.

[704.] Interpolation, Approximation, and Mechanical Quadrature (1948-49 and every third year)

C. WINSTON

[715.] Applications in Engineering Mathematics (1949-50 and every third year)

RICHARD K. COOK

[716.] Introduction to Higher Geometry (1949-50 and every third year)

[706.] Analytical Mechanics (1948-49 and every third year)

RICHARD K. COOK

708. Linear Algebra

Spring, 3 credits (every third year)

JOSEPH F. DALY

Determinants. Theory of linear dependence. Linear equations, homogeneous and nonhomogeneous. Matrix algebra; calculation of the inverse matrix; application to linear equations. Linear transformations. Quadratic forms; the matrix and discriminant. Reduction of a quadratic form to a sum of squares. The characteristic equation; definite and indefinite forms. Pairs of quadratic forms, reduction to normal form. Properties of polynomials. Invariants, covariants, half-invariants, and annihilators. Canonical formation of binary cubicals and quadratics. Symmetric functions. Elementary divisors. *Prerequisite:* Calculus.

[709.] Theory of Infinite Processes (1949-50 and every third year)

C. WINSTON

712. Theory of Functions

Year, 2 credits each semester (every third year)

C. WINSTON

Calculus will be reviewed as necessary. Complex numbers, mapping. Branches and singularities; poles and zeros. Theory of limits; sequences. Convergence; uniform convergence. Line, surface, and volume integrals. Expansion by residues. Taylor's and Laurent's series. Fourier series. Analytical continuation. Bernoulli numbers. Euler numbers. Gamma and Beta functions. Riemann surfaces. Asymptotic expansions. Summability. The hypergeometric equation. Elliptic functions. *Prerequisite:* Calculus.

[751.] Theory of Measure (1948-49 and every third year)

JOSEPH F. DALY

[505.] Elementary Numerical Analysis (1948-49 and alternate years)

HARRY POLACHEK

[755.] Advanced Numerical Analysis (1949-50 and alternate years)

HARRY POLACHEK

Some of the mathematical courses offered by the Educational Committee at the National Bureau of Standards may be of interest to prospective students, particularly as some of them are not obtainable elsewhere. The following mathematical courses are under consideration for the academic year 1947-48. Persons outside the National Bureau of Standards wishing to enroll may secure additional information from the Graduate School.

Atomic Physics	Introductory Quantum Mechanics
Chemistry of the Rarer Elements	Selected Topics in Chemical Physics
	Theoretical Mechanics

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STATISTICS

Beginning Courses

123. Survey of Statistics

Fall, 3 credits. Repeated in Spring and Summer

H. NISSELSON

A one-semester non-mathematical course designed particularly to train statistical clerks in the fields of economics, sociology, and business. Algebra is reviewed as required. Operations with symbols. Summarizing data by tabulation and by statistical predictions. The Shewhart control charts. Randomness. Computations and interpretation of statistical functions. Correlation. Business indexes. Trend analysis and curve fitting. Graphic analysis. Instruction in calculations and table making. Short cuts by the use of charts, multiplication tables, logarithms, slide rule, and other devices.

110. Graphic Methods of Presenting Statistics

Spring, 2 credits

R. G. HAINSWORTH and NELSON P. GUIDRY

Analysis of statistical data to determine what form is best for graphic presentation. Application of data to the many types of illustrations in several forms of the various classes. Rough pencil layout examples of time series charts, frequency diagrams, graphic correlation charts, pictorial symbol charts, cartograms and other illustrative examples will be prepared in class. *Prerequisite:* An introductory course in statistics, Elements of Statistical Drafting, or experience approved by the instructor.

Elements of Statistical Drafting

(See p. 124)

126. Introductory Statistics

Year, 2 credits each semester

C. M. PURVES

The collection of economic and census data. The presentation of data in tables and charts. Different kinds of averages. Dispersion. Introduction to index numbers. Relations between two or more variables. Introduction to correlation theory, regression, and interpretation of samples. Practice in calculations. *Prerequisite:* High school algebra and geometry.

127^a. Elementary Statistical Analysis*

Fall, 2 credits. Repeated in Spring and Summer

SOPHIE MARCUSE
JOSEPH STEINBERG
SAMUEL WEISS

Measures and significance of dispersion and other characteristics of distributions. Statistical control. Elementary principles of sampling and theory of errors. Design of surveys for the collection of economic and social data. Use of statistical tables, such as Tippet's, Fisher and Yates, and others. *Prerequisite:* College algebra; statistical experience advised.

* A section to be given at the Agricultural Research Center, Beltsville.

127^b. Elementary Statistical Analysis *

Fall, 2 credits. Repeated in Spring and Summer

SOPHIE MARCUSE
JOSEPH STEINBERG
SAMUEL WEISS

Relations between two or more variables. Association, correlation; regression and curve fitting. Tests of significance; estimation. Introduction to the analysis of variance. *Prerequisite:* Trigonometry and analytic geometry and the first semester.

516. Intermediate Statistics

Year, 2 credits each semester

BENJAMIN J. TEPPING

A study of selected topics, designed to introduce the student to concepts and principles of modern statistical methods and to serve as a bridge to advanced courses. The topics discussed will include probability, sampling, tests of hypotheses, analysis of variance, acceptance inspection procedures and regression problems. Related topics that may be suggested by members of the class will also be discussed. *Prerequisite:* Elementary Statistical Analysis.

318. Machine Tabulation

Fall, 1 credit. Repeated in Spring

MILTON KAUFMAN

The punch card method. Functions of the principal machines. Instruction covers wiring of all types of commercial equipment. Use of cards to obtain sums of squares and cross products in correlation is demonstrated. Registration limited to 30. *Prerequisite:* A working knowledge of tabulating equipment.

319. Advanced Study of Tabulating Equipment

Fall, 1 credit. Repeated in Spring

MILTON KAUFMAN

The solution of difficult problems in the application of tabulating equipment. The instruction includes wiring of the principal machines involved. *Prerequisite:* A course in machine tabulation.

520. Statistics of the Federal Government

Year, 2 credits each semester (alternate years)

MORRIS B. ULLMAN

Designed to give acquaintance with the wealth of data available from Federal agencies. Attention will be paid to the methods used by different agencies for the collection of data; comparisons of biases, definitions, and basic concepts; different methods of presentation. *Prerequisite:* Statistical experience in industry or the Government service or permission of the instructor.

[510.] Econometrics: Mathematical and Statistical Analysis of Economic Problems (1948-49 and every third year)**[551.] Sequential Analysis of Statistical Data****525. Elementary Analysis of Variance**

Spring, 3 credits

H. NISSELSON

Review of simple and multiple regression and relations to tests of means. Analysis of variance and covariance with equal and unequal amounts of data in sub-groups. Power function. Randomized blocks, latin squares, multiple classifications. Analysis for percentages and rates; use of ranks. Examples from social and economic data. Efficient computing techniques discussed. *Prerequisite:* Elementary Statistical Analysis.

* A section to be given at the Agricultural Research Center, Beltsville.

*Advanced Courses***723. Design and Analysis of Complex Experiments**

Year, 2 credits each semester (alternate years)

A. E. BRANDT

A course intended to cover the design of problems in testing met in agriculture and industry, the purpose being to discover the least expensive procedure for obtaining the information that is needed. Long-range agricultural experiments will be studied. Efficient procedures in weighing; best allocation of points for finding the maximum of a function, or its zeros (Hotelling). Variance, correlation, and regression methods of analysis. *Prerequisite:* Statistical experience; a degree in one of the sciences; or the consent of the instructor.

[726.] Interpretation of Statistical Calculations (1948-49 and alternate years)**727. The Planning of Statistical Surveys**

Year, 2 credits each semester (alternate years)

A. J. JAFFE

Administrative uses of statistical data. Special difficulties in the collection of information on employment, unemployment, payrolls, costs, prices, consumption, opinions and attitudes. Statement of purpose of a survey; definition of the universe, with attention to special difficulties. Interviewing; construction of questionnaires. Complete and partial investigations; comparisons of biases in different kinds of partial investigations. Advantages and disadvantages of sampling. Computation of costs. Tabulation plans. Presentation of results for research purposes and for administrative use. *Prerequisite:* Intermediate Statistics, statistical experience and academic work and practice in sociology or economics.

720. Errors in Surveys

Year, 2 credits each semester

GEORGE HAUSKNECHT

Errors arising from sources other than sampling. Problems of questionnaire construction, interviewing, and response. Psychophysical laws reviewed for structural problems. Scale analysis; tests of reliability and validity. *Prerequisite:* Elementary statistics; a degree in one of the sciences.

731. Least Squares and Curve Fitting

Spring, 3 credits (every third year)

W. EDWARDS DEMING

Curve fitting as a problem in statistical estimation. A unified approach to the various types of problems of least squares. Applications to economical design of experiment in physical and chemical analysis, and to sample design and problems of estimation in population surveys. Statistical forecasting and its pitfalls. Standard error of a forecast. *Prerequisite:* Calculus and Intermediate Statistics.

Tests and Measurements

(See p. 76)

600. Statistical Analysis in Industrial Research

Year, 2 credits each semester (alternate years)

CHURCHILL EISENHART

Modern techniques of statistical inference exemplified by application to typical problems arising in industrial and engineering research and testing. Organized in terms of the types of questions to be answered, rather than in terms of the statistical tools used to answer them. Estimation of the performance of a process or product; measuring effect of other factors on performance; comparing performance of two or more processes or products; planning the collection of data. *Prerequisite:* A degree in one of the physical sciences or engineering or consent of the instructor.

732. Sampling in Social and Economic Surveys

Fall, 3 credits

H. NISSELSON

A one-semester course. Applications of the representative method to practical and timely problems. Fallacies of the total count. Accuracy and precision. Problems involved in the selection of a sample. The theory of random sampling. The choice of sampling unit. Subsampling, stratified sampling, purposive selection. The use of intra-class correlation and analysis of variance in the design of sampling techniques. Analysis of cost data. Review of important sampling procedures as used in the United States and foreign countries. *Prerequisite:* Elementary Statistical Analysis and experience in social surveys.

733. Theory of Sampling

Year, 2 credits each semester (alternate years)

JEROME CORNFELD and W. D. EVANS

The planning of social and economic surveys to achieve maximum efficiency. The course is designed to provide general methods which may be applied to a large variety of sampling situations. Stratification; choice of sampling units. Sampling from finite population; double sampling; form of estimate; design of samples to minimize the error in estimating means, ratios, percentiles, distributions, regressions. Uses of biased methods of sampling and weighting. Evaluation of the precision and bias of the results obtained. *Prerequisite:* Elementary Statistical Analysis and Calculus.

735. Theory of Sample Surveys

Year, 2 credits each semester

MORRIS H. HANSEN and WILLIAM N. HURWITZ

History of sampling in social surveys. The use of statistical control in improving the quality and efficiency of the estimates. Calculation of sampling errors. Random, stratified random, purposive, double and systematic sampling. Cost function, choice of sampling unit; size and type of sample necessary to attain a stated degree of precision, and the distinction between precision and accuracy. The theory of probability is developed as necessary. The contributions of Fisher, Neyman, Yates, Cochran, and others are studied. *Prerequisite:* Elementary Statistical Analysis and Calculus.

717. Interview Survey Techniques in the Social Sciences

Spring, 2 credits

DWIGHT W. CHAPMAN

The basic methods of making interview surveys to obtain accurate data from respondents with regard to their attitudes and opinions, their economic and related behavior, and the information they possess on the problem being studied. Consideration is given also to market research, polls, and other types of surveys. Also included is a study of survey planning, formulation of hypotheses, questionnaire construction, methods of coding, and analysis. *Prerequisite:* A course in general psychology and one in statistics.

734. Statistical Methods for Research Workers

Year, 2 credits each semester

WALTER A. HENDRICKS

A semi-mathematical exposition of Fisher's *Statistical Methods for Research Workers*, which is used as a text. The mathematical concepts will be discussed in non-mathematical language. The text will be supplemented by other recently developed statistical techniques, including the contributions of Neyman, Pearson, Yates, Cochran, and others. Considerable attention will be devoted to the philosophy underlying the procedures. *Prerequisite:* One year of elementary statistics, calculus, or proficiency in one of the sciences.

[738.] Introduction to Sampling and Statistical Inference
(1948-49 and alternate years)

W. EDWARDS DEMING

[739.] Multivariate Analysis (1948-49 and alternate years)

740. Advanced Analysis of Variance

Fall, 3 credits (alternate years)

JOSEPH F. DALY

Selections from the works of Bartlett, Fisher, Neyman, Wilks, Yates. The general problem of the analysis of variance from the point of view of testing linear hypotheses. Generalizations of the multivariate case. Emphasis will be placed on applications to the design of experiments. Attention will be paid to the sampling conditions and the validity of the inference drawn. *Prerequisite:* Linear Algebra and Multivariate Analysis.

[741.] Theory and Application of the Characteristic Function (1948-49 and every third year)

021. Seminars in Sampling and Statistical Inference

Year, non-credit

W. EDWARDS DEMING

Annually the Department of Mathematics and Statistics conducts a series of six to eight lectures and discussions on sampling and statistical inference. These meetings, addressed by leading mathematical statisticians, are held primarily for advanced students in the Graduate School and others who are working in this field.

No fee is charged; registration, however, is required. Applications for new admissions to the seminar should be sent in writing to the Graduate School, with a statement regarding the applicant's education and experience. Notices regarding meetings are sent to those whose names are on the list.

Members of the Seminar will receive notices of meetings on statistical subjects in the Applied Mathematics Colloquium held at the National Bureau of Standards under the leadership of Dr. John H. Curtiss, Chief of the National Applied Mathematics Laboratories.

749. Control of Quality by Statistical Methods

Fall, 2 credits

W. R. PABST

Experiments in statistical variability. Chance causes and assignable causes. The Shewhart control chart. Distinctions between different kinds of charts; conditions under which each applies. Illustrations with data obtained from manufacturing. Reduced inspection. Impact of statistical methods on the writing of specifications. Quality determinations; acceptance-sampling. Advantages to purchaser and vendor through statistical methods of control and acceptance. *Prerequisite:* A first course in statistics and a college degree or equivalent in one of the sciences; statistical experience advised.

Work Measurement and Performance Standards (See p. 73)

[752.] Advanced Theory of Probability (1949-50 and every third year)

JOSEPH F. DALY

[753.] Modern Developments in Statistical Economics

Department of Office Techniques and Operations

DEPARTMENTAL COMMITTEE

FRANCIS P. BRASSOR, LL.M., Chief, Administrative Services, Civil Service Commission (Chairman)

VIRGIL L. COUCH, B.S., Chief, Personnel Division, Farmers Home Administration, USDA (Vice-chairman)

HENRY A. DONOVAN, Assistant Chief, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, USDA

STROTHER B. HERRELL, Assistant Director, Office of Personnel, USDA

A. REX JOHNSON, Ph.D., Assistant Director, Office of Foreign Agricultural Relations, USDA

JOHN S. LUCAS, Chief, Communications Division, Office of Plant and Operations, USDA

PAUL R. PRESTON, Ph.D., Chief, Division of Service Operations, Field Service Branch, Production and Marketing Administration, USDA

LEWIS R. TOLL, M.S., Consultant to The Quartermaster General, War Department

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CLERICAL-ADMINISTRATIVE PROCEDURES

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COMMITTEE ON CLERICAL-ADMINISTRATIVE PROCEDURES

HENRY A. DONOVAN (Chairman)

SIDNEY J. ADAMS, LL.B., Administrative Officer, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, USDA

FRANCIS P. BRASSOR

WILLIAM A. DEVAUGHAN, Personnel Officer, Bureau of Animal Industry, Agricultural Research Administration, USDA

LINWOOD E. DONALDSON, Chief, Records Management Section, Communications Division, Office of Plant and Operations, USDA

DWIGHT L. MYERS, Chief, Bureau Accounting Service, Division of Accounting, Office of Budget and Finance, USDA

JAMES SCAMMAHORN, Assistant Director, Office of Budget and Finance, USDA

The courses described under Clerical-Administrative Procedures are closely related to those offered in the Department of Public Administration and are an integral part of the program leading to the Certified Statement of Accomplishment in Administrative Procedures. They are practical, how-to-do-it, courses chiefly of interest to persons in grade CAF-7 positions, or below, who are either working with these procedures, or who hope to train themselves for such positions, or positions requiring some familiarity with more than one of these procedural subjects (e.g., administrative assistants and head clerks). High school graduation is a basic requirement for admission to these courses; exception will be made only on the basis of proven equivalent experience.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN

ADMINISTRATIVE PROCEDURES

The program leading to a Certified Statement of Accomplishment in Administrative Procedures should be of special interest to:

1. Persons already employed in administrative work of the procedural type, emphasizing techniques and skills.

2. Employees who aspire to enter administrative work but who, because of lack of college education, find their opportunities in that field greatly limited except at the procedural level. This program of courses is useful for persons with good native ability but limited educational background, because it prepares them for a level of work most likely to be open to them. After they have succeeded in getting into administrative work, perhaps even at the clerical-administrative level, they can then combine their work-experience and study-experience to mutual advantage as progress is made toward greater responsibility. This approach is believed to be better for such persons than the common practice of attempting to circumvent the usual educational requirements by shortcut concentration on advanced and specialized courses, which are actually preparatory for responsible positions only insofar as they *supplement* broader educational background.
3. Employees who wish to prepare to become Junior Administrative Assistants or to head units concerned with administrative procedures.

Approach

Emphasis on techniques, procedures, methods, but with an attempt to understand and use these means in terms of administrative ends or objectives.

Objectives

Ultimately, for responsible conduct of important "housekeeping" operations of specialized character, direction of small units, performance of most difficult and responsible tasks in the procedural aspects of administration, and the settlement of questions of intermediate importance arising out of current or contemplated operations and not covered by existing regulations or decisions.

Immediately, for effective service in some administrative procedure at the clerical or semi-clerical level, as a means of entrance into the line of promotion leading to the responsibilities named above. (Students already at this level may arrange programs in conformity with their needs.)

Requirements

1. High-school diploma or equivalent.
2. Sixteen semester hours of credit selected from the following Graduate School courses:
 - a. A minimum of eight credits must be selected from courses offered in the Department of Public Administration (excluding all accounting courses except Federal Government Accounting).

- b. For the remaining eight credits the student may select from the following in the Department of Office Techniques and Operations:
 1. From all courses offered in the field of Clerical-Administrative Procedures.
 2. Government Letter Writing or Writing Procedures and Instructions.
- c. A course in elementary statistics (not exceeding three credits) may be included. It is not required. If it is included, three credits may be deducted from *b* above.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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108. Administrative Procedure

Fall, 2 credits. Repeated in Spring and Summer

SIDNEY J. ADAMS
THOMAS J. HICKEY

Intended for persons who wish to become supervisors or administrative assistants or who are now serving in such capacity in a small organizational unit. Deals with the "HOW" aspects of the day to day assignments for which these persons ordinarily are responsible, such as preparation of budget data for small organizational units; preparation of recommendations on personnel actions in a typical organization; the maintenance of office records; orientation and assignment of new employees, essential requirements for good supervision.

The second part of this course deals with the introduction to administrative planning, administrative procedures and management generally at the lowest organization level, including work reporting and work measurements, work processes and work control reports; relation of these studies to the budgetary and personnel needs of the unit; and the theory of staff versus operating jurisdiction over administrative planning.

208. Advanced Administrative Procedure

Fall, 2 credits. Repeated in Spring

JOHN D. MOSELEY

Intended for persons who are now assigned to administrative assistant and supervisory positions. Deals with (1) the conduct of administrative and procedural surveys and audits directed toward the development of factual data for management purposes; the analysis of these data, the preparation of reports and recommendations thereon; (2) the putting into effect of the approved recommendations through the actual drafting of procedural instructions and the designing and standardization of forms; (3) the installation of approved procedures and the establishment of executive controls to insure compliance with approved instructions; (4) the modern and tested techniques and methods ordinarily used in developing factual data and graphic presentations regarding flow of work, organization structure, work assignments, authority, work duplications, delays and bottlenecks; (5) report writing; (6) the value of illustrated presentations of work processes in eliminating duplication of work, in simplifying operations and in cutting out unnecessary steps; (7) the value of and the need for specific written manuals of instructions as tools of management; and (8) the relation of these instructions to those taught in the other Office Techniques and Operations Courses. *Prerequisite:* Completion of one of the following courses in Office Techniques and Operations: 108, 110, 112, 114, 115, 116, 117, 210.

101. Business Mathematics

Fall, 2 credits. Repeated in Spring and Summer

RALPH R. BOTTS

Designed for clerical workers who are called upon to apply fundamentals of arithmetic to their jobs. Emphasis will be placed on review of business arithmetic including fractions, ratios, proportion, percentages, common divisors and multiples, progressions and elementary graphs and statistics. Special applications will be made to business problems such as simple interest; simple, bank, cash and trade discount; profit and loss; sales turnover; equation of partial payments and accounts; commuting debts; compound interest; compound discount; and annuities. Use of calculating machine and slide rule will be explained.

110. Federal Auditing Procedure

Fall, 2 credits. Repeated in Spring and Summer

CAREY G. CRUIKSHANK

This intensive one-semester course is intended for those having no previous knowledge of the subject and is designed to furnish fundamental training for employees now in lower grades as clerks, typists, machine operators, etc., who intend to take the course on Advanced Federal Auditing Procedure or who have opportunities of eventually becoming auditors by serving apprenticeships. It covers explanations of, discussions on and practice work with the two most common types of Government vouchers; deals with, to a limited extent, certain related documents and procedures and should prepare students for higher grades and better-paying positions. The Manual outlines in detail various pertinent procedures.

Embraces general and basic principles; definitions of terms, description and use of standard forms involved, authorizations and allocations; general procedure in auditing standard form 1034 vouchers; suspensions and disallowances, General Accounting Office exceptions and replies; purchase order procedure and its relation to auditing; tax exemption procedure and its effect upon auditing; general procedure in auditing standard form 1012 vouchers; authority for travel, emergency travel per diem allowances, method of computation; methods of travel, duty status and leave, application of statutes, regulations and Decisions of the Comptroller General; exigency statements, special correspondence; and practice audit work on standard form 1034 "purchase" vouchers and standard form 1012 "reimbursement" vouchers.

210. Advanced Federal Auditing Procedure

Fall, 2 credits. Repeated in Spring

EMMETT B. COLLINS

Includes explanations of and discussion on Federal auditing policy and practice along advanced lines. Covers the relationship of auditing to general fiscal control; administrative examination of fiscal documents; application of legislation and regulations; use of Comptroller General Decisions; relation of Comptroller General's Decisions to particular cases; normal methods of handling suspensions, disallowances, certifications, etc.; unusual problems in the audit of standard form 1034 vouchers and 1012 vouchers; relationship of procurement to auditing and the policies followed in the use of purchase orders; authority for travel and policies relating thereto; per diem allowances and computations, and policies respecting rates; transportation of property and personnel, use of transportation requests and bills of lading; audit of transportation vouchers; audit of payrolls and application of payroll procedures; General Accounting Office exceptions and preparation of replies; claims, adjustments and direct settlements. This advanced course in Federal Auditing Procedure is designed to assist auditors to prepare themselves for more responsible and more remunerative positions. *Prerequisite:* Federal Auditing Procedure or equivalent experience.

112. Federal Accounting Procedure

Fall, 3 credits. Repeated in Spring and Summer

JOHN L. TIERNEY

Designed particularly to train accounting clerks through instruction of employees now working in lower grades and to assist accounting clerks in present and prospective positions. It embraces explanation of, discussion on, and practice work with the basic ledgers (allotment ledger, objective classification ledger,

and general ledger) maintained in connection with funds made available to Federal agencies. Appropriation, apportionment, allotment, disbursement, collection, and reporting processes will be discussed and the relationship between administrative accounts and accounts kept by the Treasury Department and the General Accounting Office explained.

116. Federal Budgetary Procedure

Fall, 2 credits. Repeated in Spring

EUGENE B. WILHELM

This course is designed to assist employees either in budget work or preparatory to taking budget work, up to and including Grade CAF-9. It deals with budgetary procedures, including the preparation of estimates, justifications, tabular statements, graphs, etc., and, in connection with budget execution, outlines methods in making allotments, operating budgets, analysis of reports, preparation of apportionment and obligation reports, and other methods used in the formulation and execution of the Federal budget.

122. Federal Payroll Procedure

Fall, 2 credits. Repeated in Spring

LOUISE M. KRUEGER and WILLIAM E. MARSHALL

This course deals with the basic principles and procedures relative to paying compensation to Federal employees, including pay computation, deductions, pay roll preparation with special emphasis on the "Simplified Payrolling Procedure" prescribed by the General Accounting Office, scheduling, processing the voucher, pay roll adjustments, and Decisions of the Comptroller General relating to pay. In addition the course will cover the necessary accounting work involved in individual earnings, retirement, tax, bonds, and other deductions, and reconciliation of records within the pay roll unit and with the general accounting records. It is designed to assist present and future pay roll clerks in understanding the current Federal Employees Pay Act and in operating under the "Simplified Payrolling Procedure."

115. Federal Purchasing Procedure

Fall, 2 credits

JAMES SCAMMAHORN

Elementary principles and ethics of Federal purchasing in general and its relation to operating programs; historical background; organization for purchasing; purchasing and contracting authority; basic practices and procedures with legal and administrative background; use and preparation of requisition, purchase order, bid, bill of lading; voucher and other procurement forms; sources of supply such as General Supply Schedules, Government warehouses, prison industries, blind-made products; War Assets Administration, commercial market, and how to use such sources; open market and bid purchases; leasing of space; preparation, inviting and award of bids, including fundamentals of writing specifications; advertisements in publications; formal contracts, including source of supply contracts, and bid and performance bonds; inspection of deliveries for compliance with specifications.

215. Advanced Federal Purchasing Procedure

Spring, 2 credits

JAMES SCAMMAHORN

Standard Federal Specifications, what they are and how to use them; warehousing, storage and issue; property accountability and relation of purchasing to utilization and property management; traffic and transportation rules and procedures to be followed in making shipments of supplies and equipment and employees' household goods; disposition and sale of surplus personal and real property under Surplus Property Act of 1944; use of U. S. Standard Commodity Classification and Handbook of Description of Property; exchange of property; excise taxes; procurement of special items; laws, Decisions of the Comptroller General and regulations affecting procurement; and relationship between the service and supply and related service functions such as accounting, fiscal and budgetary processes. *Prerequisite:* Federal Purchasing Procedure.

Management of Governmental Purchasing (See p. 80)

Property Management (See p. 80)

114. Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring and Summer

VERNA C. MOHAGEN

Deals with the elementary principles and procedures of Federal personnel administration, including a study of the Federal personnel structure and organization, history and progress of the merit system, rules and regulations of the Civil Service Commission, and other basic procedural sources; use of personnel forms, records and files systems; Civil Service examinations and recruitment; appointments; transfers; promotions; separations, terminations and reductions in force; suspensions and disciplinary actions; retirement; efficiency ratings; leave and hours of duty; personnel reports, applications of Decisions of the Comptroller General, administrative policy statements, and administrative orders.

214. Advanced Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring

VERNA C. MOHAGEN

Similar to Federal Personnel Procedure but more thorough in its treatment of the subject. Deals with advanced principles and techniques in Federal personnel procedures and their relation to operating programs, including a study of the principles of the Civil Service Act, Rules and Regulations, and their application to day-to-day problems in a Federal personnel office; recruiting sources for Civil Service examinations and appointments; study of promotion-from-within procedures; reduction-in-force procedures, and their application to specific operating situations; policies and their procedures for the handling of veterans' problems including placement of returning veterans; study of procedures for systematic retirement of employees reaching annuity age; procedures for investigation and enforcement of discipline; periodic reports and their use for operating purposes; procedure and policy statements in the general field of personnel administration; procedural source materials such as the Civil Service Commission, Federal Personnel Manual, Decisions of the Comptroller General, Executive Orders, etc., and applying them to detailed operating procedures; relationship of the personnel office to budget, accounting, payrolling, and other staff functions. *Prerequisite:* Federal Personnel Procedure or equivalent practical experience in a Federal personnel office at Grade CAF-4 or above.

117. Records Management Procedure

Fall, 2 credits

L. E. DONALDSON, C. T. SMITH and Lecturers

Instruction in basic practices and procedures for maintaining and servicing Government records including mail and messenger service. Includes detailed instructions and actual practice in methods of recording communications, and classifying, coding, indexing and filing correspondence and other documents. Designed for students who desire to enter this field or who are interested in supplementing their knowledge of the mechanics of record keeping.

217. Advanced Records Management

Spring, 2 credits

L. E. DONALDSON, C. T. SMITH and Lecturers

Designed to give the student a comprehensive knowledge of the management of Government records. Principles of good records management; the organization and functions of records offices; planning and simplifying procedures; work flow; space arrangement; and system selection and installation. Also includes a discussion of laws and regulations governing preservation and disposal of records, appraisal, systematic retirement, storage, disposal and microphotography. *Prerequisite:* Records Management Procedure or equivalent or consent of instructor.

413. Office Management

Fall, 2 credits. Repeated in Spring

DANIEL M. BRAUM

Designed to give supervisors and administrative assistants familiarity with the fundamental principles and methods needed by them to do a satisfactory management or supervisory job. Deals with the common day to day administrative problems and questions encountered by supervisors such as, (1) determination of space requirements and proper space allocation with due regard to flow of work; (2) the utilization and care of all existing facilities—equipment, labor saving devices, communications, etc.; (3) discussion of the effect of heat, light and ventilation on the morale and output of employees; (4) development and use of management tools in the Federal Government; (5) planning for improvements—how to secure participation by officials, supervisors and employees in suggesting and making improvements; and (6) a treatment of many management aides and devices not specifically covered in other Graduate School courses.

GOVERNMENT LETTER, REPORT, AND PROCEDURAL WRITING**120. Government Letter Writing**

Fall, 2 credits. Repeated in Spring

VERNE L. SAMSON

The writing of clear, accurate, concise, courteous letters and memoranda contributes to efficiency and economy in administration. This course gives the student (1) opportunity to work out the principles of effective letter writing; (2) practice in criticizing and revising outgoing correspondence, and in planning and drafting replies to incoming letters; and (3) drill in the fundamentals of good writing.

440. Writing Procedures and Instructions

Fall, 2 credits

WILLIAM S. HARRIS and C. E. WYLIE

A course of instruction in how to develop, write, and issue manuals, circulars, office memoranda, and other forms of rules, regulations, instructions, and procedures. Special attention will be given to ways of improving the readability of such material, particularly through logical organization of the subject matter, the use of a clear, simple style of writing, and proper format. Consideration will also be given to: (1) Relations of the procedures' writer with subject matter specialists and administrators; (2) Assembling source materials and drafting issuances; (3) Editing issuances drafted by others; (4) Obtaining approvals; (5) Codifying; (6) Indexing; (7) Coordinating issuances.

Practical English Usage (See p. 24)**Vocabulary Building** (See p. 24)**Writing for Official Purposes** (See p. 28)**Reporting to Top Management** (See p. 70)**Machine Tabulation** (See p. 44)**Advanced Study of Tabulating Equipment** (See p. 44)**SECRETARIAL PRACTICES****COMMITTEE ON SECRETARIAL PRACTICES**

ROBERT L. HILL, A.B., Head, Salary Administration Section, Division of Classification, Office of Personnel, USDA (Chairman)

PAUL R. PRESTON

LEWIS R. TOLL

325. Secretarial Practices

Fall, 2 credits

MILDRED R. STEPHENS

A course designed for Government employees whose work is, or is closely related to, that of a stenographer or secretary. The purpose is to develop an understanding of what constitutes a successful job through discussion and illustration of (1) need for fundamental facts about the agency and its relationships to other agencies and the public; (2) employee's part in the agency program; (3) skills needed to perform work; (4) familiarity with available services, sources of information and other reference materials; (5) relationships with other employees; (6) handling of contacts with various officials, the public and others. *Prerequisite:* Background training or experience as a stenographer or secretary.

SHORTHAND

COMMITTEE ON SHORTHAND

LEWIS R. TOLL (Chairman)

CLYDE I. BLANCHARD, Managing Editor, Gregg Publishing Company

ALICE COFFMAN, Administrative Officer, Interim Research Planning Division, ESP, State Department

BERNARD P. FOOTE, B.S.S., Assistant Clerk Stenographer, Board of Immigration Appeals, Department of Justice

MELDANETTE METCALF, Editor, Bureau of Dairy Industry, Agricultural Research Administration, USDA

CLARA RICHTER, B.S., Placement Technician, War Assets Administrations

JALVA VALE, B.S., Management Analyst, Research Branch, Office of Temporary Controls, Office of Price Administration

These courses are designed to furnish Federal employees an opportunity to follow a program of training for stenographic careers in the Federal service. While each course represents a separate unit of study, with emphasis on material used in the Federal service, a proper sequence of courses insures a sound foundation for successfully qualifying for the various grades and classifications of stenographers in the Federal service.

"Review of Gregg" will serve as rapid review for the student who has not applied his shorthand knowledge for a long time, or has used it so little that he feels uncertain about applying his knowledge to practical office dictation. Students finishing "Beginning Gregg Shorthand I" may continue with "Beginning Gregg Shorthand II" and then the "Gregg, 70 to 100 Words." Because the "Gregg, 100 to 130 Words" course is an intensive course on technical material, students should have a sound foundation in theory and be able to write 100 words a minute with a 95 percent accurate transcript before registering for the course. Home study is required to attain goals set in course descriptions. Amount of study required varies according to the learning habits and individual goals of students.

A prerequisite for all shorthand courses is the ability to type with a fair degree of accuracy and speed.

As a general guide to assist employees who wish to plan a course of study to build for a stenographic or stenographic-reporting career in the Federal service the following parallels are drawn:

<i>Course</i>	<i>Goal</i>	<i>Prerequisites</i>
I. Beginning Gregg Shorthand I	Thorough knowledge of shorthand theory up to disjoined prefixes and suffixes; mastery of brief forms; ability to write legible outlines and to take dictation of new and practiced material; ability to read shorthand plates at a fairly rapid rate.	For those who have not studied shorthand, or for those who have some knowledge of shorthand but have not completed basic theory.
II. Beginning Gregg Shorthand II	Completion of theory; mastery of prefixes, suffixes, special forms, and abbreviated words; ability to take dictation of business letters and standard test material at 70 words a minute and to produce mailable transcripts.	For those who have completed "Beginning Gregg Shorthand I" or its equivalent.
III. Gregg Shorthand 70 to 100 Words	Complete theory review; ability to take dictation at 100 words a minute for 5 minutes; ability to produce acceptable transcripts of letters and reports dictated at rates varying from 70 to 100 words a minute.	For those who have completed Shorthand I and II or equivalent theory and dictation courses and who have a minimum speed of 70 words a minute on new, standard material.
IV. Gregg Shorthand 100 to 130 Words	Ability to take dictation of new, standard material at 130 words a minute for 5 minutes; ability to produce, at a good rate of speed, accurate transcripts of letters, reports, conferences, and telephone conversations.	For those who have a minimum dictation speed of 100 words a minute and who are able to produce accurate transcripts of letters and reports.
V. Introduction to Reporting—Gregg (130 to 150 Words)	Ability to record conferences and hearings 60 to 70 percent verbatim; introduction to reporting techniques.	For those who have qualified on 120-word a minute, standard tests or their equivalent.
VI. Reporting—Gregg (150 Words and up)	Ability to use high-speed short-cuts and advanced reporting methods; verbatim reporting of lectures, hearings, and conferences.	For those who have qualified on 140-word-a-minute or 160-word-a-minute standard tests or the equivalent.

89. Review of Gregg Shorthand

Fall, non-credit. Repeated in Spring and Summer

NAOMI H. EVANS

A review of theory and brief forms. Reading from shorthand plates and students' own notes; dictation of standard material at various progressive rates of speed. *Prerequisite:* Completion of the Gregg Manual or its equivalent by the functional system.

129. Beginning Gregg Shorthand I

Fall, 3 credits. Repeated in Spring and Summer

CLARA RICHTER
JALVA VALE**130. Beginning Gregg Shorthand II**

Fall, 3 credits. Repeated in Spring and Summer

CLARA RICHTER
JALVA VALE**230. Gregg Shorthand, 70 to 100 Words**

Fall, 2 credits. Repeated in Spring and Summer

ALICE COFFMAN

231. Gregg Shorthand, 100 to 130 Words

Fall, 2 credits. Repeated in Spring

LEWIS TOLL

335. Introduction to Reporting—Gregg, 130 to 150 Words

Fall, 4 credits

BERNARD P. FOOTE

336. Reporting—Gregg, 150 Words and Up

Spring, 4 credits

BERNARD P. FOOTE

Practical English Usage

(See p. 24)

Vocabulary Building

(See p. 24)

Department of Physical Sciences

DEPARTMENTAL COMMITTEE

HENRY STEVENS, Ph.D., In Charge, Chemical Investigations of Allergens in Agricultural Products, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, USDA (Chairman)

CAPT. R. D. BENNETT, Ph.D., Technical Director, Naval Ordnance Laboratory, U. S. Naval Gun Factory, Navy Department

ELSA ORENT KEILES, D.Sc., Principal Nutrition Chemist, Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, USDA (Vice-chairman)

CHARLES E. KELLOGG, Ph.D., Chief, Division of Soil Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, USDA

L. W. CURRIER, Ph.D., Geologist, U. S. Geological Survey, Department of Interior
CHARLES F. SARLE, Ph.D., Head, Division of Special Farm Statistics, Bureau of Agricultural Economics, USDA

L. B. TUCKERMAN, Ph.D., Assistant Chief, Division of Mechanics and Sound, National Bureau of Standards, Department of Commerce

HARRY WEXLER, Ph.D., Chief, Special Scientific Services Division, U. S. Weather Bureau, Department of Commerce

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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Courses offered in this department reflect the dependence of governmental functions on the principles and applications of the physical sciences. Unusual opportunity is afforded for advanced study in special fields under the guidance of scientists whose professional interests are directed to the subjects of their courses. These courses are designed to provide basic training for entrance to or advancement in the professional scientific occupations.

Familiarity with the fundamentals of the physical sciences, short of a working knowledge, is widely recognized as a useful asset to those whose cultural or professional interests are directed to the economic and social aspects of government. Accordingly, the curriculum of this department includes facilities for securing formal instruction in the fundamental sciences.

CHEMISTRY

100. General College Chemistry

Year, 4 credits each semester (alternate years)

ROBERT G. WILLIAMSON

This course presents the fundamental principles of chemistry and shows their applications to everyday life. It attempts to develop an understanding of scientific methods of problem solving and to develop scientific attitudes.

First semester: Chemical principles, the gas laws, the kinetic theory, atomic structure and the classification of the elements, valence, oxidation and reduction, the solid and liquid states, solutions, and ionization. The laboratory work consists of experiments which parallel the lectures.

Second semester: Chemical equilibrium, reaction rates, solubility product constants, hydrogen ion concentration, the colloidal state, catalysts, metals and their compounds. The laboratory work consists of a study of the qualitative analysis of the more common cations and anions.

The class meets in the Chemistry Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W.

248. Organic Chemistry (1948-49 and alternate years)

ELLIS HAWORTH

400. Advanced Organic Chemistry

Year, 2 credits each semester

C. VERNE BOWEN

An advanced course in principles of organic chemistry. Reactions of the aliphatic, aromatic, carbocyclic and heterocyclic compounds will be considered. Newer developments will be presented. This course may be used as a refresher course. *Prerequisite:* One year of organic chemistry.

401. Agricultural Chemistry

Year, 2 credits each semester

ROSCOE H. CARTER

Includes an introduction and brief review of the fundamental principles of chemistry. Plant and animal biochemistry including the principles of organic and inorganic constituents of plants and animals will be discussed. Other topics include: soils, fertilizers, liming materials, insecticides, fungicides, spray residues, food preservation, vitamins, enzymes, proteins and similar subjects. Details of the methods of analysis of many of these materials will be discussed. *Prerequisite:* Organic chemistry.

600. Fundamental Properties of High Polymers

Year, 2 credits each semester

ROBERT SIMHA

After a brief review of pertinent background material and a consideration of some general properties of chain molecules, the discussion will be devoted to three main topics: the behavior of polymers in solution, physical properties of bulk materials, and the kinetics of formation of synthetic polymers. The first part will comprise a consideration of the measurement of molecular weights by thermodynamic procedures, viscosity and sedimentation rate, the determination of molecular shapes and the study of solute-solvent interaction by thermodynamic and other means. The second part will deal with the visco-elastic properties of rubber, plastics and fibrous materials, crystallization and transition phenomena and dielectric properties of polar polymers. In the last part polycondensation reactions, vinyl-type polymerization and copolymerization reactions will be treated. Throughout, a unified treatment of all classes of chain-type polymers will be presented. Stress will be laid on current research and original literature references will be given. *Prerequisite:* Elementary physical and organic chemistry, thermodynamics, or consent of the instructor.

349. Physical Chemistry

Year, 2 credits each semester

WALTER J. HAMER

Lecture course on the fundamental laws of chemical reactions. Correlations between molecular structure and physical and chemical properties of matter are considered. The principles of thermodynamics, thermochemistry, chemical equilibrium, and chemical activation are discussed. Other topics include the phase rule, eutectic mixtures, and cooling curves; colloids; adsorption; solutions; ionization and electrolytic conductance; electrode potentials; speed of reactions; effects of radiation on chemical reactions; industrial distillation problems; isotopes; and radioactivity and transmutation of the elements. *Prerequisite:* One year general chemistry; calculus; or permission of the instructor.

522. Biochemistry

Year, 2 credits each semester

CARTER D. JOHNSTON

Lecture course on principles of biochemistry. It deals with the chemistry of proteins, fats, and carbohydrates, general chemical composition of animal tissues, e.g., muscle, nerve, milk, and blood; brief discussion of enzymes of the gastro-intestinal tract; digestion and absorption of principal foodstuffs; metabolism of proteins, fats, and carbohydrates; mineral metabolism; chemical constituents of urine; and general discussion of the chemistry and physiology of the vitamins and hormones concludes the course. *Prerequisite:* Organic chemistry.

[350.] Food Technology**[762.] Electrochemistry (1948-49 and alternate years)**

WALTER J. HAMER

Recent Developments in Plant Physiology and Plant Nutrition (See p. 22)**Statistical Analysis in Industrial Research** (See p. 45)**Glass Blowing** (See p. 124)**Reporting to Top Management** (See p. 70)**Writing for Official Purposes** (See p. 28)**Protecting Engineering and Scientific Developments through Patents** (See p. 120)**Psychology of Human Relations** (See p. 110)**Effective Meetings** (See p. 28)**Advanced Public Speaking** (See p. 26)**Management Responsibilities for the Administrative Scientist** (See p. 70)

COMMITTEE ON EARTH SCIENCES

S. W. BOGGS, Special Consultant on Geography, Department of State (Chairman)

ROLLIN S. ATWOOD, Ph.D., Assistant Chief,
Division of International and Functional
Intelligence, Department of StateW. H. BRADLEY, Ph.D., Chief Geologist, Geo-
logic Branch, U. S. Geological Survey,
Department of InteriorCARLETON F. BARNES, Ph.D., Chief Analyst,
Soil Uses and Productivity, Division of
Soil Survey, Bureau of Plant Industry,
Soils, and Agricultural Engineering, Agri-
cultural Research Administration, USDAL. W. CURRIER
CHARLES E. KELLOGG
CHARLES F. SARLE

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It is recognized that there are unusual facilities in the Washington area for study and research in the earth sciences. To make most effective use of these facilities in the interest of advanced education and research, the Committee on Earth Sciences proposed that

the Graduate School enlist the cooperation of representatives from some of the major universities offering extensive work in these fields and from related professional associations such as the Division of Geology and Geography of the National Research Council.

Under the sponsorship of the National Research Council and the Graduate School, a conference of representatives of University Departments of Geology and Geography, together with representatives of Federal agencies with activities in these fields, was held. The conference recommended ". . . that the Graduate School . . . undertake to meet the obvious needs of Government workers and others in the Washington area in the fields of Geology and Geography. . . ." Two committees were appointed by Arthur Bevan, Chairman, Division of Geology and Geography, National Research Council. These committees, one representing Geology and the other Geography, have been set up to advise with the Department of Physical Sciences and the Committee on Earth Sciences regarding a program of study in these fields. This activity probably will result in the organization of additional courses in the Earth Sciences and will be reflected in later announcements of the Graduate School.

NRC-USDA GRADUATE SCHOOL ADVISORY COMMITTEE FOR GEOLOGY

K. K. LANDES, Chairman, Department of Geology, University of Michigan (General Chairman)

DAVID M. DELO, Research and Development Division, General Staff, War Department (Local Chairman)

L. H. ADAMS, Director, Geophysical Laboratory, Carnegie Institution of Washington

A. F. BUDDINGTON, Chairman, Department of Geology, Princeton University

G. ARTHUR COOPER, Curator of Invertebrate Paleontology and Paleobotany, U. S. National Museum

RICHARD H. FLEMING, Chief, Division of Oceanography, Hydrographic Office, Navy Department

HERBERT INSLEY, Petrographer, National Bureau of Standards, Department of Commerce

PAUL F. KERR, Executive Officer, Department of Geology, Columbia University

W. W. RUBEY, Geologist, U. S. Geological Survey, Department of Interior

NRC-USDA GRADUATE SCHOOL ADVISORY COMMITTEE FOR GEOGRAPHY

S. VAN VALKENBURG, Director, Graduate School of Geography, Clark University (General Chairman)

W. W. ATWOOD, JR., Committee on Geographical Exploration, Joint Research and Development Board (Local Chairman)

CARLETON P. BARNES, Division of Soil Survey, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, USDA

S. W. BOGGS, Special Adviser on Geography, Department of State

CHARLES C. COLBY, Chairman, Department of Geography, University of Chicago

LESTER E. KLIMM, Professor of Geography, University of Pennsylvania

JOHN K. ROSE, Geographer, Advanced Research Section, Legislative Reference Service, Library of Congress

GEOGRAPHY AND GEOLOGY

455. Geomorphology of the United States

Fall 3 credits

LOUIS L. RAY

A survey of the geomorphic provinces and sections of the United States and contiguous areas in Canada and Mexico. The work of the course will involve

lectures, readings and map studies with special emphasis on the geologic foundations of land forms. *Prerequisite:* Courses in physical and historical geology.

The Cultural Regions of the United States (See p. 114)

World Agriculture (See p. 104)

Cartography (See p. 121)

Ground Methods of Topographic Surveying (See p. 120)

SOIL SCIENCES

156. Soil Conservation

Fall, 2 credits

J. GORDON STEELE

The soil as a resource and why we need to conserve it. Brief review of physical features and land use in the United States as they affect soil conservation. Properties of soil and water. Erosion processes. Farm conservation plans, including the land inventory and the choice and application of conservation practices on the farm. Community action through soil conservation districts. Estimates of the conservation job.

A knowledge of farming, and some previous training in earth sciences, biology or other related subjects are desirable but not essential. Outside readings and reports will be assigned according to the interests and background of the students.

157. Soil Fertility and Management*

Fall, 3 credits

ROGER P. HUMBERT

Factors that determine the fertility of the soil and its response to fertilization, liming, green manuring, and other practices are developed. Attention is given to the determination of fertilizer needs and the use of fertilizers in relation to soil conditions, crops grown, and the development of a management system on the individual farm. The properties and use of commercial fertilizer materials and mixtures are discussed.

531. Soils: Their Morphology, Genesis, and Classification*

Spring, 3 credits

CHARLES E. KELLOGG

The nature of soils and the broad principles governing their behavior are first discussed, followed by consideration of soil morphology, formation, and classification. Particular attention is given to characteristics of the great soil groups and their genesis in relationship to the physical and biological forces of the environment. Soil geography of the United States is dealt with broadly, but some examples from other parts of the world are used. Throughout the course, relationships of soil characteristics to agricultural development, soil use and conservation, and patterns of human occupancy are emphasized. *Prerequisite:* Freshman chemistry or its equivalent. Previous or collateral reading in plant physiology, geology, geography, and logic would be helpful, but not essential.

Soil Mechanics (See p. 118)

Ground-water Hydraulics (See p. 118)

* To be given at the Agricultural Research Center, Beltsville.

METALLURGY

452. Principles of Physical Metallurgy

Fall, 2 credits

BLAKE M. LORING

Development, meaning, and use of equilibrium diagrams for binary alloys. Iron-carbon diagrams and their relation to cast iron and steel, and to the critical points important in heat-treating ferrous alloys. Steel-treating processes depending on non-equilibrium conditions, including the TTT-Curve. Alloy steels. Aging and precipitation hardening. Segregation and other ingot defects. Mechanical and physical tests, including the interpretation of micrographs. Non-ferrous alloys of industrial importance. *Prerequisite:* College chemistry and physics.

526. Advanced Physical Metallurgy

Spring, 2 credits

BLAKE M. LORING

Basic concepts of the physics of metals are discussed in order to develop a better understanding of the common mechanical tests and manufacturing processes. Topics include: definition of a metal; introduction to the crystalline nature of matter; classification of metallic elements according to crystalline structure; relationship between crystalline structure and physical properties; the equilibrium diagram and its relation to physical properties and crystalline structure; introduction to X-ray metallography with calculations from diffraction patterns of metals (illustrated); X-ray evidence of cold working and recrystallization; internal stresses in metals; plastics deformation; theory of metal hardening, ferrous and non-ferrous; diffusion and diffusion processes.

METEOROLOGY

With the growing importance of aircraft operations in military and civilian activities, meteorology is undergoing a rapid expansion. Before proceeding on his flight, the pilot must consult the meteorologist regarding upper-air winds, cloud ceiling, threat of icing and thunderstorms, etc., along his route. Interest in meteorology has increased greatly recently and it is expected that the study of meteorology will assume greater importance in the future.

The course in Principles of Meteorology is intended for persons who desire a general outlook in meteorology and who are not interested in becoming professional meteorologists. The remaining courses are intended to give a fundamental and comprehensive meteorological background for persons interested in pursuing a career in meteorology or related fields.

162. Principles of Meteorology

Fall, 3 credits. Repeated in Spring

CHARLES B. JOHNSON

A course of a descriptive nature explaining the principles of meteorology essentially on a non-mathematical basis. Especially adapted to preparation for sub-professional employment in the Government and to obtaining the basic meteorological knowledge required of a civilian pilot.

533. Hydrology

Year, 3 credits each semester

RAY K. LINSLEY

A two-semester course in basic and applied hydrology at the professional level. The first semester will be largely descriptive, covering such topics as ele-

mentary hydraulics; measurement and interpretation of streamflow, precipitation and other basic data; the hydrologic cycle; physics of soil moisture; the infiltration theory; wave travel and the unit hydrograph. The second semester will cover the development and application of procedures for applying basic hydrology to practical problems of river forecasting and design of water control works including such subjects as streamflow routing, flood frequency, the rational method of estimating flood magnitude, hydrometeorology, forecasting of runoff, influence of water control structures on streamflow, and problems of water control operation. *Prerequisite:* Physics and algebra; elementary meteorology, statistics, and engineering desirable.

534. Introduction to Dynamic Meteorology

Year, 2 credits each semester (alternate years)

SIDNEY TEWELES, JR.

Designed to illustrate the use of higher mathematics and physics in the interpretation of meteorological phenomena, and in the development of forecasting techniques. *Prerequisite:* Calculus, or consent of the instructor.

536. Physical and Synoptic Meteorology

Year, 3 credits each semester

ALEXANDER L. SHANDS

A two-semester course in the fundamentals of modern meteorology for the professionally interested student. The first semester stresses the physical aspects—atmospheric composition and structure and their measurement; gas laws; adiabatic, pseudo-adiabatic, and non-adiabatic processes; thunderstorms; fog; wind. The second semester stresses synoptic features—general and local circulations, air masses, fronts, cyclones and anticyclones, upper-air charts, forecasting. Problems involving basic units and graphic manipulations will be assigned. *Prerequisite:* Physics and algebra; trigonometry and elementary meteorology desirable.

[537.] Weather Analysis and Forecasting (1948–49 and alternate years)

SIDNEY TEWELES, JR., and ROBERT G. BEEBE

350. Physics of the Upper Atmosphere

Spring, 2 credits

(To be announced)

This course will include a discussion of such topics as: distribution of meteorological elements, ionization of the upper atmosphere, propagation of electromagnetic waves, light of the night sky, the aurora, ozone, anomalous propagation of sound, meteors, optical phenomena, cosmic rays, and diurnal variation of terrestrial magnetism.

The course will be of interest to those who are investigating the physics of the upper atmosphere, including meteorologists and those engaged in problems of electromagnetic propagation. *Prerequisite:* College physics.

Air Transportation

(See p. 109)

Elementary Aerial Photogrammetry

(See p. 121)

Design and Analysis of Complex Experiments

(See p. 45)

PHYSICS

153. Introductory College Physics

Year, 4 credits each semester

WILLIAM A. KILGORE

Intended for those who have had no work in physics on the college level. The course consists of lectures, demonstrations, and individual laboratory work.

First semester: Mechanics, heat, and sound, with major emphasis upon the concepts of mechanics.

Second Semester: Light, electricity, and electronics, with major emphasis upon electricity.

The class meets in the Physics Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W.

Principles of Air Conditioning

(See p. 117)

430. Introduction to Modern Physics

Year, 2 credits each semester

MARTIN A. GARSTENS

Photoelectric and thermionic effects, the theory of relativity, the origin of spectral lines, wave mechanics, atomic structure and optical spectra, X-rays, nuclear physics and cosmic rays. *Prerequisite:* Two years of college physics and calculus, or consent of the instructor.

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NATIONAL BUREAU OF STANDARDS EDUCATIONAL COURSES

The Educational Committee of the National Bureau of Standards has developed a series of courses to provide graduate training in physics. The courses are of graduate grade and are recognized by many of the leading universities in granting credit for advanced degrees. Although these courses are planned primarily for members of the staff of the National Bureau of Standards and are given at the laboratories of the Bureau, other qualified students may enroll. Persons outside the National Bureau of Standards wishing to enroll may secure additional information from the Graduate School.

The following courses in physics are offered after working hours:

Selected Topics in Chemical Physics	Introductory Quantum Mechanics
Atomic Physics	Theoretical Mechanics
Chemistry of the Rarer Elements	

Department of Public Administration

DEPARTMENTAL COMMITTEE

WILLIAM G. FINN, M.S., Assistant to the Administrator, Production and Marketing Administration, USDA (Chairman)

GLADYS L. BAKER, Ph.D., Agricultural Historian, Bureau of Agricultural Economics, USDA

H. DEAN COCHRAN, D.Sc., Chief, Division of Personnel Management, Forest Service, USDA

EARL W. LOVERIDGE, B.S.F., Assistant Chief, Forest Service, USDA (Vice-chairman)

WILLIAM A. MINOR, B.S.A., Assistant to the Secretary of Agriculture, USDA

HARLOW S. PERSON, Ph.D., Consulting Economist, Office of the Administrator, Rural Electrification Administration, USDA

DONALD C. STONE, M.A., Assistant Director, In Charge of Administrative Management, Bureau of the Budget

JOHN THURSTON, Ph.D., Secretary, Administrative Council, USDA

COMMITTEE ON GENERAL ADMINISTRATION

HARLOW S. PERSON (Chairman)

JOHN M. CARMODY, Former Commissioner, U. S. Maritime Commission

JOHN J. CORSON, Ph.D., Director of Circulation, The Washington Post

HENRY S. DENNISON, Ph.D., President, Denison Manufacturing Company

ARTHUR S. FLEMING, LL.D., Commissioner, U. S. Civil Service Commission

JOHN M. GAUS, Ph.D., Professor of Political Science, University of Wisconsin

JOSEPH P. HARRIS, Ph.D., Professor of Political Science, University of California

DILLARD B. LASSETER, M.A., Administrator, Farmers Home Administration, USDA

EARL W. LOVERIDGE

LEONARD D. WHITE, Ph.D., Professor of Public Administration, University of Chicago

OPPORTUNITIES FOR STUDY AND WORK

The importance of public administration is apparent in the modern state with its emphasis on services, control, operation, and collective action in the public interest. The more the public service is called upon to assume functions previously exercised by individuals or private enterprise the greater the importance of the principles and techniques of public administration. Management problems raised by the war illustrate the critical need for more and better training in public administration, particularly in the junior and assistant positions, even in normal times. The increasing delegation of discretion to administrative agencies has raised unprecedented problems of organization, public consent, and administrative responsibility.

Washington is of necessity the national focal point of all these developments. Many of the ablest and most experienced public administrators are assembled in Washington. Many of the most competent practitioners of the various specialized branches of administration are likewise concentrated in Washington. Utilizing this unique environment and this unexcelled talent, the Graduate School offers courses geared to demonstrated needs and taught by experienced administrative personnel.

SUGGESTIONS FOR PROGRAM OF STUDY

The following courses cover a wide range of approaches for varying levels of responsibility. Some give background and attitude, and some give methods and skill. Some have their objectives high and broad for perspective and knowledge of relationships; some have their objectives comparatively narrow and sharply focused for skill and ability to perform particular tasks. It is hoped that students will select those courses which supplement and complement their work assignments rather than concentrate exclusively on more intensive training in the performance of daily tasks.

General Administration. Persons who have not had such a course, or varied administrative experience, should begin with Introduction to Public Administration. This course and other basic work should precede courses in special branches of administration (e.g., personnel or financial administration) in order that such courses may be of maximum usefulness.

Personnel Administration. Unless substantial experience can be substituted, the general course, Personnel Administration, should be taken before the specialized courses (such as Position Classification, Selection and Placement, etc.). Persons who are in positions classified as Grade CAF-5 or below and desire to prepare for personnel work should take Federal Personnel Procedure; they should not attempt to take the specialized courses until they have gained substantial experience in personnel work or have carefully laid a foundation by completing all basic, general courses.

Financial and Budgetary Administration and Procurement and Property Management. Students interested in financial administration can begin with Federal Budgetary Procedure, continue with Financial Organization and Procedures of the Federal Government, then take Budget Formulation followed by Budget Execution. In purchasing, students qualified to work toward the program for a Certified Statement of Accomplishment in Public Administration should take Management of Governmental Purchasing. It is desirable for other students to take Federal Purchasing Procedure first.

Accounting and Auditing. Students in classification grades below CAF-5 will find it advantageous to begin with Federal Accounting Procedure or Federal Auditing Procedure. Preparation for higher-level accounting should begin with a year's study of Principles of Accounting, after the completion of which Federal Government Accounting may be taken. Second Year Accounting, Cost Accounting, Auditing, Federal Tax Accounting, Advanced Accounting Problems, and Analysis and Interpretation of Financial Statements provide advanced training for those who desire to progress

further with a general accountancy program. (See p. 82 for Certified Statement of Accomplishment in Accounting.)

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN PUBLIC ADMINISTRATION

The program leading to a Certified Statement of Accomplishment in Public Administration should be of special interest to:

1. Persons already employed in responsible administrative positions. Included in this group are many with specialized training who have been transferred to administrative positions from professional positions without training or previous experience in administration.
2. Junior Administrative Assistants and junior administrative technicians of all kinds.
3. Recently recruited Junior Professional Assistants. Those who entered the service with a public administration option may profit from courses both more advanced and more specialized than those taken in college. Those who entered on various professional options and are now employed in such professions can profit very greatly from these courses if they expect, or wish to prepare, to enter into administrative work connected with their professional fields.
4. Employees who wish to broaden their understanding and improve their efficiency through a "tour of duty" by study, in lieu of an actual tour of duty for which they have found no opportunity.
5. Employees with college background who aspire to transfer to a career in administrative management.

Approach

Broad-gauge, essentially long-range approach to develop leadership, perspective, broad outlook, and understanding of the human factors in administration; emphasis on principles, with opportunity for study of some techniques in relation to policy.

Objectives

Ultimately, for policy formulation, improvement of administrative machinery, coordination of operations, and general management and control of large units. Immediately, for initial investigations as a junior member of a staff having the responsibilities named above, for assumption of increasingly difficult and more responsible assignments in these fields, and for supervision and management of small units.

Requirements

1. Bachelor's degree or equivalent. (Note: The degree requirement may be waived in the case of well-qualified students who have received a Certified Statement of Accomplishment in Administrative Procedures.)
2. Twenty-four semester hours of credit in Graduate School courses offered in the Department of Public Administration, excluding all accounting courses except Federal Government Accounting. The 24 credit hours are to be distributed as follows:
 - a. A minimum of four credits from the Division of General Administration.
 - b. A minimum of two credits from the Division of Organization and Methods Analysis.
 - c. The remaining eighteen credits may be selected from the Divisions of Financial and Budgetary Administration, Personnel Administration, Legal Administration, Procurement and Property Management, Government-Public Relationships or additional courses in *a* or *b* above.

Upon approval, courses outside the Department of Public Administration may be taken where they are properly in line with the student's major interest.

Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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DIVISION OF GENERAL ADMINISTRATION

341. American National Government

Fall, 2 credits. Repeated in Spring and Summer

CHARLES W. SMITH

History and origins of the national Government of the United States; the political process—parties and elections; the legislative process; the functions of the national Government and their administration; courts and judicial review of legislation. Students are advised to take this course before Introduction to Public Administration.

344. Introduction to Public Administration

Fall, 3 credits. Repeated in Spring and Summer

DAVID S. BROWN

This course is designed to introduce the student to the elements of public administration. Attention will be devoted to the evolution of administrative organization; organizational types: staff, line, and auxiliary agencies and functions; controls of administration; the broadest aspects of personnel selection, classification, training, movement, and relations; budgeting and fiscal control; federal-state relations; administrative legislation and adjudication. The object

of the course is to lay a broad foundation for more intensive courses in management. *Prerequisite:* High school graduation or equivalent, or one course in the Clerical-Administrative Procedures Group, Department of Office Techniques and Operations. Desirable to have had American National Government.

[515.] The Legislative Process (1948-49 and alternate years)

400. Administrative Operations for Congressional Assistants

Spring, 2 credits

W. MANLY SHEPPARD

This course deals with the practical administrative problems encountered by secretaries and other staff assistants to U. S. Senators and Congressmen. Such matters as the following will be considered: organizing the office routines; handling veterans' affairs; relations with the executive departments; the practical workings of Congress and assistance with legislative matters; pressure groups; relations with constituents; political organization and campaigns. Enrollment limited to employees of the Legislative Branch, except by consent of instructor.

626. Federal Administrative Management

Fall, 2 credits. Repeated in Spring

HARVEY E. BECKNELL

An advanced seminar designed to aid persons who are carrying substantial administrative management responsibilities. Emphasis is placed upon the integration of all management functions and the development of a philosophy of management which is equally applicable to all phases. Lectures and discussions cover the following general topics, with particular attention to their interrelationships and interdependence: administrative planning and research; principles of organization; personnel selection, placement, training and relations; administrative leadership, direction, supervision and coordination; administrative reporting; budget formulation and execution; and the auxiliary management services. Practical problems presented by class members for group discussion. *Prerequisite:* Bachelor's degree plus Public Administration Courses 344 and 555, or bachelor's degree in public or business administration, or experience in administrative management at Grade CAF-9 or above.

627. Reporting to Top Management

Fall, 2 credits. Repeated in Spring

PATTERSON FRENCH

Deals with the techniques and substance of reporting to top management in terms of the nature of the top management job and the operator's responsibility for implementing it. Discusses the various kinds of reporting, administrative requirements essential to effective reporting, reporting strategy and techniques, and other factors essential to preparing an effective report to top management. *Prerequisite:* Employment at Grade CAF-11, P-4 or above, or equivalent experience, or consent of instructor.

Writing for Official Purposes

(See p. 28)

570. Management Responsibilities for the Administrative Scientist

Spring, 2 credits

WILSON F. HARWOOD

This course is designed to assist persons with backgrounds in scientific or professional fields to carry out effectively supervisory and administrative responsibilities. Techniques and methods will be discussed with respect to work planning, leadership, selecting personnel, organizing the staff, procuring equipment and supplies, budgeting available funds and employees' time, developing efficient work methods, directing and scheduling operations, coordinating effort, developing skills, maintaining high morale, and reporting results. *Prerequisite:* Bachelor's degree, supervisory experience or permission of the instructor.

INSTITUTIONALIZED RESEARCH

Integrated relationships between scientific research and administration have long been of concern to the Department of Agriculture as they have also to other governmental and non-governmental agencies. Institutionalized research, or research organized on a large-scale basis, to be fully effective requires the finest blending of technical research knowledge and experience, with administrative theory and practice. Though the problems of successfully fusing research and administration, whether in the research agency, the laboratory or the person of the scientist-administrator, have been recognized and discussed extensively, organized efforts to learn more about these problems have been comparatively few. Yet their implications are of tremendous significance not only for education, for science and for administration, but for all human activities in this age of research.

In cooperation with the Naval Research Laboratory, the Graduate School, in 1946, began tentatively to explore this matter on an organized basis. The seminar course, Management Responsibilities for the Administrative Scientist, was organized as a pilot. Arrangements were made for members of this seminar, all of whom had advanced research-administrative responsibilities, to identify areas needing attention. A small committee, chaired by E. I. Kotok, Assistant Chief in Charge of Research, Forest Service, and others with broad research and administrative experience, such as P. V. Cardon, former Agricultural Research Administrator, has been exploring this matter further. The course, Research Projects: Planning and Administration, has been proposed. Plans for additional courses on the organization and operation of large laboratories are under consideration. The recommendations of the committee will be put into effect beginning with the 1948-49 program.

[610.] **Research Projects: Planning and Administration**
(1948-49 and alternate years)

Social Problems of Administration

(See p. 113)

DIVISION OF GOVERNMENT-PUBLIC RELATIONSHIPS

COMMITTEE ON GOVERNMENT-PUBLIC RELATIONSHIPS

ROBERT LYLE WEBSTER, M.S., Associate Director of Information, Office of Information, USDA (Chairman)

JOHN CRIDER, B.Litt., Member of the Staff,
Washington Bureau, New York Times

WILLIAM A. JUMP, Director of Finance and
Budget Officer, Office of Budget and Finance,
USDA

WILLIAM V. LAMBERT, Ph.D., Research Administrator,
Agricultural Research Administration, USDA

ARTHUR ORR, Executive Secretary, Agricultural
Sub-Committee on Appropriations, House
Appropriations Committee

MORSE SALISBURY, B.S., Assistant Secretary
General, International Emergency Food
Council

JOHN THURSTON

LYLE F. WATTS, M.F., Chief, Forest Service,
USDA

710. Public Relationships in Government Administration

Spring, 2 credits

R. L. WEBSTER and SPECIALISTS

Designed to give to Federal administrators and those who look forward to executive positions an appreciation of the scope and fundamental nature of public relationships of a Government agency. Particularly useful, also, to professional Federal information workers through emphasis given on relating all forms of information work to an integrated administrative program. Prominent persons identified with certain of the major fields covered will participate in the conduct of the course.

Course work includes: general review of the place of public relationships in public administration; historical review of the growth of public relations work in the Federal government; public reporting and the Congress; review of public relations activities of other governments; field relationships; some aspects of public relationships of international agencies; evaluation of the major mass media and group contact activity and development of working guides for integrating use of these media into efficient Government administration. *Prerequisite:* Limited to persons holding responsible positions in general or related administrative work, or those in the field of information work, or those who look forward to executive positions and receive the consent of the instructor.

Introduction to Public Information Media (See p. 27)

Visual Presentation in Federal Information Work (See p. 28)

Effective Meetings (See p. 28)

Advanced Public Speaking (See p. 26)

City Planning and Urban Development (See p. 123)

DIVISION OF ORGANIZATION AND METHODS ANALYSIS

COMMITTEE ON ORGANIZATION AND METHODS ANALYSIS

HAROLD A. STONE, M.S., Chief, Division of Fiscal Management, Office of Budget and Finance, USDA (Chairman)

STANLEY T. GORDON, M.S., Management Analyst, Office of Budget and Management, Office of the Secretary, Department of Commerce

SHIRLEY K. HART, M.B.A., Director, Division of Research and Statistics, Federal Housing Administration

THOMAS J. HICKEY, LL.M., Assistant Deputy Director, Finance Division, Bureau of Medicine, Navy Department

LEONARD W. HOELSCHER, Assistant Chief, Division of Administrative Management, Bureau of the Budget

FREDERICK MOSHER, M.S., Acting Chief, Informational and Cultural Branch, Division of Foreign Service Planning, Department of State

ORLANDO A. SIMMES, Management Consultant, Management Planning Division, Department of State

EDWARD B. WILBUR, A.B., Assistant Chief, Management Improvement Branch, Bureau of the Budget

Three courses are offered to afford students an opportunity for progressive study and advancement in the general field of organization and methods work (hereafter called O&M work). Scientific management as found in industry is, in part, translated and applied to governmental operations. The courses use to advantage, among other background data, the instructional and case materials developed by the Bureau of the Budget and by other governmental agencies. A student progressing through these courses should de-

Graduate School

1947-48



27th Year

Schedule of Classes

Fall Semester

REGISTRATION—Begins September 8

HOURS:

9:00 A.M. to 6:20 P.M., Monday through Friday

9:00 A.M. to 1:00 P.M., Saturday, September
13, 20

Veterans are requested to register:

3:00 P.M. to 6:20 P.M., Monday through Friday

9:00 A.M. to 1:00 P.M., Saturday, September
13, 20

CLASSES BEGIN WEEK OF SEPTEMBER 22

Time Schedule and Supplement

to 1947-48 Bulletin

Complete details, including rules and regulations, policies, and course descriptions, are given in the **1947-48 Bulletin**, a copy of which may be obtained by writing (use form on bottom of page) or by calling in person. Please do not telephone. Counselors and training officers of your agency have a copy which you may examine.

Counseling on courses and programs of study is available at all times from members of the School staff who are glad to assist students in planning their work.

Registration: begins September 8 (Room 1031, South Building, Department of Agriculture). See schedule of hours on front cover. No one will be registered for credit after October 3, except with special permission of instructor and Registrar. A late registration fee of \$1.00 per course will also be charged after October 3. Registration closes in a course when the maximum for that class is reached.

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Room schedules will be posted on the 4th and 7th wing bulletin boards in the South Agriculture Building.

Classes begin during week of September 22, end the week of January 12.

Graduate School, Department of Agriculture
Washington 25, D.C.

Please send me your 1947-48 BULLETIN.

Name

Street

City Zone
No.....

OFFICE TECHNIQUES

- 108. Administrative Procedure (Hickey, Adams) W 6-8 \$16 p. 50
- 208. Advanced Administrative Procedure (Moseley) M 6-8 \$16 p. 50
- 101. Business Mathematics (Botts) Th 6-8 \$16 p. 51
- 110. Federal Auditing Procedure (Cruikshank) M 6-8 \$16 p. 51
- 210. Advanced Federal Auditing Procedure (Collins) Tu 6-8 \$16 p. 51 [p. 51]
- 112. Federal Accounting Procedure (Tierney) F 6-9 \$24
- 116. Federal Budgetary Procedure (Wilhelm) M 6-8 \$16 p. 52
- 122. Federal Payroll Procedure (Krueger, W. Marshall) M 6-8 \$16 p. 52
- 115. Federal Purchasing Procedure (Scammahorn) M 6-8 \$16 p. 52
- 114. Federal Personnel Procedure (Mohagen) M 6-8 \$16 p. 53
- 214. Advanced Federal Personnel Procedure (Mohagen) Tu 6-8 \$16 p. 53
- 117. Records Management Procedure (Donaldson, C. T. Smith and Lecturers) Tu 6-8 \$16 p. 53
- 413. Office Management (Braun) M 6-8 \$18 p. 54
- 120. Government Letter Writing (Samson) F 6-8 \$16 p. 54
- 440. Writing Procedures and Instructions (Harris, Wylie) Th 6-8 \$18 p. 54
- 325. Secretarial Practices (Stephens) Th 6-8 \$16 p. 55
- 89. Review of Gregg Shorthand (N. Evans) Tu-Th 6-7:30 \$24 p. 57
- 129. Beginning Gregg Shorthand I (Richter) M-Tu-Th 6-7 \$24 p. 57
- 130. Beginning Gregg Shorthand II (Vale) M-Tu-Th 7:10-8:10 \$24 p. 57
- 230. Gregg Shorthand, 70 to 100 Words (Coffman) Tu-Th 6-7:30 \$24 p. 57
- 231. Gregg Shorthand, 100 to 130 Words (Toll) M-W 6-7:30 \$24 p. 57
- 335. Introduction to Reporting—Gregg, 130 to 150 Words (Foote) M-Th 6:30-8:30 \$32 p. 57

PHYSICAL SCIENCES

- 100. General College Chemistry (Williamson) M-Th 6:30-9 \$32 and \$7.50 laboratory fee p. 58
- 400. Advanced Organic Chemistry (Bowen) Th 6-8 \$18 p. 59
- 401. Agricultural Chemistry (Carter) W 6-8 \$18 p. 59
- 600. Fundamental Properties of High Polymers (Simha) M 7-9 \$18 p. 59
- 349. Physical Chemistry (Hamer) Tu 6-8 \$16 p. 59
- 522. Biochemistry (Johnston) W 6-8 \$18 p. 60
- 455. Geomorphology of the United States (Ray) Th 6:30-9:30 \$27 p. 61
- 156. Soil Conservation (Steele) Th 6-8 \$16 p. 62
- 157. Soil Fertility and Management¹ (Humbert) M 5-8 \$24 p. 62
- 452. Principles of Physical Metallurgy (Loring) Th 6-8 \$18 p. 63 [p. 63]
- 162. Principles of Meteorology (C. Johnson) Tu 6-9 \$24
- 533. Hydrology (Linsley) Th 6-9 \$27 p. 63
- 534. Introduction to Dynamic Meteorology (Teweles) M 6-8 \$18 p. 64
- 536. Physical and Synoptic Meteorology (Shands) W 6-9 \$27 p. 64
- 153. Introductory College Physics (Kilgore) M-Th 6:30-9 \$32 and \$5 Laboratory fee p. 64
- 430. Introduction to Modern Physics (Garstens) F 6-8 \$18 p. 65

¹ To be given at the Agricultural Research Center, Beltsville.

Time Schedule and Supplement

to 1947-48 Bulletin

Complete details, including rules and regulations, policies, and course descriptions, are given in the 1947-48 Bulletin, a copy of which may be obtained by writing (use form on bottom of page) or by calling in person. **Please do not telephone.** Counselors and training officers of your agency have a copy which you may examine.

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Name.....

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Explanation: Basic information about each course is given in the following order: course number, title, instructor, day and hour of class meeting, fee, and page of 1947-48 **Bulletin** on which description may be found. The first half and the second half of a course are indicated by a and b respectively.

BIOLOGICAL SCIENCES

- 110. **General College Biology** (Olson) M-Th 6:30-9 \$32
and \$5 laboratory fee p. 20
- 209. **Systematic Botany**¹ (Blake) M 5-7 \$16 p. 20
- 200. **Poultry Husbandry**¹ (Knox, Bird and Specialists) M
5-7 \$16 p. 20
- 201. **Beekeeping** (Nolan) Tu 7-9 \$16 p. 20
- 546. **Advanced Insect Morphology** (Snodgrass) M 7-9
\$18 p. 21
- 512. **Medical and Veterinary Entomology** (Bishopp) M
6-8 \$18 p. 21
- 603. **Advances in Plant Breeding and Genetics**¹ (Steven-
son and Specialists) M 5-7 \$18 p. 22
- 609. **Recent Developments in Plant Physiology and
Plant Nutrition**¹ (Cullinan and Specialists) M 5-7
\$18 p. 22

LANGUAGES AND LITERATURE

- 222. **English Composition** (Miller) Tu 6-9 \$24 p. 23
- 223. **Descriptive English Grammar** (Harman, K. Ward)
M 6-8 \$16 p. 24
- 51. **College English for Foreign Students** (H. Williams)
M 7-9 \$16 p. 24
- 118. **Practical English Usage** (C. White) Th 6-8 \$16
p. 24
- 119. **Vocabulary Building** \$16 p. 24
Section I¹ (Becker) M 5-7
Section II (Greene) Th 6-8
- 224. **Creative Writing** (Holt) Tu 6-8 \$16 p. 24
- 330. **Great Books** (Scofield) M 6:30-8:30 \$16 p. 25
- 228. **Fundamentals of Speech** (Mohler) Th 6-8 \$16
p. 25
- 232. **Voice and Remedial Speech** (Emery) Tu 6-8 \$16
p. 26
- 50. **Speech Clinic** (Emery) Schedule to be arranged
\$30 p. 26
- 320. **Introduction to Public Information Media** (Fitz-
patrick) W 6-8 \$16 p. 27
- 225. **Editing** (Merrill and Specialists) M-W 7:15-8:45 \$24
p. 27
- 226^a. **Writing for Official Purposes** (McClarren and Spe-
cialists) Th 6:30-8:30 \$16 p. 28
- 245. **Radio Script Writing** (Molohon) M 6-8 \$16 p. 28
- 240. **Visual Presentation in Federal Information Work**
(Webster and Specialists) Th 6-8 \$16 p. 28
- 120. **Indexing** (Doyle, Bradley) W 6-7 \$8 p. 29
- 237. **Government Printing Procedure** (L. Anderson) Th
6:30-8:30 \$16 p. 29
- 43. **Personal Development** (Provinsen, Galvin) Tu 6-8
\$16 p. 29
- 253^a. **Elementary French** (Humphrey) M-Th 6-7:30 \$24
p. 32
- 254^a. **Intermediate French** (Humphrey) Tu-F 6-7:30 \$24
p. 32
- 255^a. **Conversational French** (Given) W 6-9 \$24 p. 32
- 259^a. **Elementary German** (Marianne Lederer) M-Th 6-
7:30 \$24 p. 32
- 259^b. **Elementary German** (Ponti) Th 6-9 \$24 p. 32
- 260^a. **Intermediate German** (Max Lederer) W 6-9 \$24
p. 32
- 261^a. **Conversational German** (Bauer) W 6-9 \$24 p. 32
- 270^a. **Elementary Italian** (Rossetti) W 6-9 \$24 p. 32
- 271^a. **Intermediate Italian** (Rossetti) Th 6-9 \$24 p. 32

¹ To be given at the Agricultural Research Center, Beltsville.

- 295^a. **Elementary Russian** \$24 p. 33
 Section I (Schuler) M 6-9
 Section II (Tarakus) W 6-9
- 295^b. **Elementary Russian** (Tarakus) M 6-9 \$24 p. 33
- 296^a. **Intermediate Russian** (Saharov) Tu 6-9 \$24 p. 33
- 297^a. **Conversational Russian** (Saharov) W 6-9 \$24 p. 33
- 300^a. **Elementary Spanish** \$24 p. 33
 Section I (Batista) W 6-9
 Section II (E. Jaffe) Th 6-9
- 300^b. **Elementary Spanish** (B. Supervia) M 6-9 \$24 p. 33
- 301^a. **Intermediate Spanish** (Parsons) W 6-9 \$24 p. 33
- 302^a. **Spanish Conversation and Literature** (R. Supervia) Tu 6-8 \$16 p. 34
- 574^a. **Advanced Spanish Conversation** (B. Supervia) Th 6-8 \$18 p. 34
- Intensive Language Instruction** (See the Registrar) p. 30
- Directed Language Study** (See the Registrar) p. 31

MATHEMATICS AND STATISTICS

MATHEMATICS

1. **Review of Freshman Mathematics** (Schell) Tu 6-9 \$24 p. 40
2. **Review of Calculus** (H. Horton) Th 6-9 \$24 p. 40
102. **Algebra** (Rhodes) M-F 7-8:30 \$24 p. 41
206. **Calculus** (Finan) W-F 6-7:30 \$24 p. 41
502. **Differential Equations** (Cook) Th 6:30-9:30 \$27 p. 41
712. **Theory of Functions** (Winston) Th 6:30-8:30 \$18 p. 42

STATISTICS

123. **Survey of Statistics** (Nisselson) W 6-9 \$24 p. 43
126. **Introductory Statistics** (Purves) W 6:15-8:15 \$16 p. 43
- 127^a. **Elementary Statistical Analysis** \$16 p. 43
 Section I¹ (Marcuse) M 5-7
 Section II (Weiss) M 6-8
- 127^b. **Elementary Statistical Analysis** (Steinberg) Th 6-8 \$16 p. 44
516. **Intermediate Statistics** (Tepping) Tu 6-8 \$18 p. 44
318. **Machine Tabulation** (Kaufman) W 6:30-8:30 \$12 p. 44
319. **Advanced Study of Tabulating Equipment** (Kaufman) F 6:30-8:30 \$12 p. 44
520. **Statistics of the Federal Government** (Ullman) W 6:30-8:30 \$18 p. 44
723. **Design and Analysis of Complex Experiments** (Brandt) W 6-8 \$18 p. 45
727. **The Planning of Statistical Surveys** (A. Jaffe) W 7-9 \$18 p. 45
720. **Errors in Surveys** (Hausknecht) F 8-10 \$18 p. 45
600. **Statistical Analysis in Industrial Research** (Eisenhart) M 7-9 \$18 p. 45
732. **Sampling in Social and Economic Surveys** (Nisselson) Tu 6-9 \$27 p. 46
733. **Theory of Sampling** (Cornfield, W. D. Evans) M 6-8 \$18 p. 46
735. **Theory of Sample Surveys** (Hansen, Hurwitz) W 7:30-9:30 \$18 p. 46
734. **Statistical Methods for Research Workers** (Hendricks) Tu 6-8 \$18 p. 46
740. **Advanced Analysis of Variance** (Daly) W 6-9 \$27 p. 47
021. **Seminars in Sampling and Statistical Inference** (Deming) Schedule to be announced
749. **Control of Quality by Statistical Methods** (Pabst) W 6-8 \$18 p. 47

¹ This section will be given at the Agricultural Research Center, Beltsville.

OFFICE TECHNIQUES

108. **Administrative Procedure** (Hickey, Adams) W 6-8 \$16 p. 50
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536. **Physical and Synoptic Meteorology** (Shands) W 6-9 \$27 p. 64
153. **Introductory College Physics** (Kilgore) M-Th 6:30-9 \$32 and \$5 Laboratory fee p. 64
430. **Introduction to Modern Physics** (Garstens) F 6-8 \$18 p. 65

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PUBLIC ADMINISTRATION

- 341. American National Government (C. W. Smith) Tu 6:30-8:30 \$16 p. 69
- 344. Introduction to Public Administration (Brown) W 6-9 \$24 p. 69
- 626. Federal Administrative Management (Becknell) M 6:15-8:15 \$18 p. 70
- 627. Reporting to Top Management (French) Tu 6-8 \$18 p. 70
- 555. Principles and Techniques of O&M Work (Gill, Divine) W 6-8 \$18 p. 73
- 780. Establishing and Administering O&M Work (Stone, Loftus) F 6:15-8:15 \$18 p. 73
- 519. Work Measurement and Performance Standards (McKillop and Specialists) Tu 6-8 \$18 p. 73
- Organization and Methods Clinic (McKillop) p. 73
- 525. Financial Organization and Procedures of the Federal Government (Tiller) Tu 6-8 \$18 p. 74
- 635. Agency Budgetary and Financial Administration: Budget Formulation (Roberts, Jump and Staff) Th 6-8 \$18 p. 74
- 561. Public Personnel Administration (Stahl) Tu 6-8 \$18 p. 75
- 530. Selection and Placement (McLean) Th 6-8 \$18 p. 76
- 629. Tests and Measurements (Carroll) Th 6-8 \$18 p. 76
- 559. Position Classification (Hill, Laxton) M 6-8 \$18 p. 76
- 643. Advanced Position Classification (Laxton, Findlay) Tu 6-8 \$18 p. 76
- 640. Veterans Legislation and Administration (Loggins and Specialists) Tu 6-8 \$18 p. 77
- 305. Fundamentals of Accident Prevention (Wetzel, Jenkins) W 6-8 \$16 p. 77
- 535. Safety Engineering I: Technical Functions (Wetzel, Jenkins) Tu 6-8 \$18 p. 77
- 620. Training Management (Henderson) Tu 6-8 \$18 p. 78
- 633. Employee Relations and Employee Services (Kraus) F 6-8 \$18 p. 78
- 842. Personnel Division Management (Couch) M 6-8 \$18 p. 78
- 320. Introduction to Administrative Law and Procedure (E. Johnson) Th 6-8 \$16 p. 79
- 637. Management of Governmental Purchasing (Scam-mahorn) Th 6-8 \$18 p. 80
- 352^a. Principles of Accounting—First Half \$24 p. 82
Section I (Rowe) M 6-9 W 6-7
Section II (Dye) Tu 6-9 Th 6-7
- 352^b. Principles of Accounting—Second Half (H. Mar-shall) Tu 6-9 Th 6-7 \$24 p. 83
- 353^a. Intermediate Accounting—First Half (Hord) M 6-9 \$24 p. 83
- 422. Business Law (Mostow) Tu 6:30-8:30 \$18 p. 83
- 354. Federal Government Accounting (C. Mason) W 6-9 \$24 p. 83
- 642. Cost Accounting (D'Alessandro) W 6-9 \$27 p. 84
- 645. Federal Tax Accounting (Moyer) M 6-9 \$27 p. 84
- 646. Advanced Accounting Problems (Acker) W 6-9 \$27 p. 84

SOCIAL SCIENCES

- 200. Introduction to Economics, Theory and Institu-tions (Allin) Th 6-8 \$16 p. 90
- 201. Principles of Economics (Burroughs) Tu 6-9 \$24 p. 90
- 705. History of Economic Thought (Wasserman) W 7-10 \$27 p. 90

528. **International Financial and Trade Policies** (Zaglits)
Th 6-8 \$18 p. 91
704. **Economic Theory of International Trade** (Wad-
leigh) W 6-8 \$18 p. 91
410. **Land Economics** (V. Johnson) Tu 6-8 \$18 p. 94
411. **Agricultural Finance** (D. Horton) W 6-9 \$27 p. 94
203. **Introduction to Marketing** (B. White) Th 6-9 \$24
p. 95
414. **Economics of Marketing** (Southworth) Tu 6:15-8:15
\$18 p. 95*
- Lectures on **Agricultural Programs** (Minor, T.
Reid) M 4:30-5:30 as announced p. 96
530. **Methods of Price Analysis** (Been, Walsh) W 6:15-
8:15 \$18 p. 95
716. **Seminar on Agricultural Policies** (Minor, Wells)
M 6:15-8:15 every other week \$9 p. 96
700. **Basic Evaluation Adapted to Extension Teaching**
(Sabrosky) Schedule to be announced p. 97
701. **Research Methods and Techniques as Applied to**
Extension Work (Gallup) Schedule to be an-
nounced p. 97
695. **Extension Thesis** (Wilson) Schedule to be arranged
p. 97
325. **Managing Personal Finances** (Larsen and Special-
ists) Tu 6-8 \$16 p. 98
521. **Economics of Food** (M. Reid) M 6-8 \$18 p. 98
460. **Introduction to Medical Economics** (Klem and
Specialists) M 6-8 \$18 p. 99
305. **Introduction to Labor Problems** (Klein) Tu 6-8
\$16 p. 100
760. **Government and Labor Problems** (Ziskind) Tu 6-9
\$27 p. 101
427. **Psychology of International Politics** (Spitzer) M
6-9 \$27 p. 103
725. **Seminar in the Practice and Technique of Inter-
national Administration** (Calderwood) W 6-8
\$18 p. 104
814. **World Agriculture** (Hainsworth, Purves, Whipple)
Tu-Th 6-8 \$36 p. 104
065. **Food and Agriculture Organization of the United**
Nations: Background and Programs (Hambidge,
Rogers) W 6:30-8:30 \$16 p. 105
430. **Modern Russia** (Tereshtenko) W 6-9 \$27 p. 105
432. **Modern Japan** (Yoshioka) F 6-8 \$18 p. 106
337. **Principles of Transportation** (Nelson) Tu 6-9 \$24
p. 108
338. **Regulation of Communication** (Emery) Th 6-8
\$16 p. 107
601. **Traffic Management** (Perrin) Th 6-9 \$27 p. 109
651. **Commercial Air Transportation** (Robinson) Tu 6-9
\$27 p. 109
400. **Psychology of Human Relations** (Sparks) M 6-8
\$18 p. 110
501. **Social Psychology** (McKain) W 6-8 \$18 p. 110
504. **Personality Disorders** (Cornsweet) W 6-8 \$18
p. 111
505. **Principles of Interviewing** (Pryor, Bradford) W 6-8
\$18 p. 111
215. **General Sociology** (Raper) Th 6-9 \$24 p. 112
509. **La America Latina y los Estados Unidos** (Green) M
6-8 \$18 p. 113
516. **The Cultural Regions of the United States** (Taylor,
Raper) M 6-9 \$27 p. 114

TECHNOLOGY

403. **Principles of Air Conditioning** (Dill) Tu 6:30-8:30
\$18 p. 117
501. **Transmission and Distribution Systems for Area**
Electrification (Eardley) Th 6-9 \$27 p. 117

702. **Electric Utility Engineering** (Jessel) M 6-8 \$18 p. 117
706. **Advanced Hydraulics** (M. Mason) W 6:30-9:30 \$27 p. 117
301. **Soil Mechanics** (Barber) Th 6-9 \$24 p. 118
715. **The Engineers' Responsibility in the Administration of Contracts** (Seeley) W 6-8 \$18 p. 118
550. **Contracts and Specifications** (W. Smith and Specialists) Th 6:30-9:30 \$27 p. 119
553. **Engineering in Materials Supply Operations** (MacLeod) M 7-9 \$18 p. 119
215. **Route Surveying** (Rapple) M 6-8 \$24 (Field work, all day, every fourth Saturday) p. 120
212. **Elementary Aerial Photogrammetry** (Higginson) W-F 7-9 \$24 p. 121
214. **Cartography** (Everett) Tu 6-8 \$16 p. 121
321. **Pencil Sketching and Freehand Drawing** (Cadmus) M-W 6-8 \$24 p. 121
322. **Art Appreciation** (Richards) Tu 6-8 \$16 p. 121
323. **Drawing for Portraiture and Illustration** (Lazzari) M-W 6-8 \$24 p. 122
320. **Water Color Painting** (Lyon) M-Th 6-8 \$24 p. 122
- 331^a. **Home Decoration** (Garrels) W 6-7 \$8 p. 122
332. **Advanced Home Decoration** (Garrels) W 7-8 \$8 p. 122
316. **Landscape Development of the Small Property** (Gardner) Th 6-8 \$16 p. 122
324. **Basic Mechanical Drawing I** (Wiemer) Tu-F 6-8 \$24 p. 123
340. **Architectural Drafting I** (Wiemer) M-Th 6-8 \$24 p. 123
342. **Architectural Drafting III** (Wiemer) M-Th 6-8 \$24 p. 123
305. **Elements of Statistical Drafting** (Guidry) Tu 6-9 \$16 and \$2 laboratory fee p. 124
188. **Glass Blowing** (Clark) M-W 6-7:30 \$24 p. 124
70. **Popular Photography** (Knoblock) Tu 6-8 \$16 p. 125
192. **Fundamentals of Photography I** (Briggs) M 6-8 \$16 p. 125
193. **Practice of Photography I** \$16 and \$3 laboratory fee p. 125
Section I (Purdy) W 6-8
Section II (Briggs) Tu 6-8
194. **Fundamentals of Photography II** (Cobb) W 6-8 \$16 p. 125
195. **Practice of Photography II** (Purdy) M 6-8 \$16 and \$3 laboratory fee p. 125
307. **Color Photography—Theory** (Materazzi) Tu 6-8 \$16 p. 126
308. **Color Photography—Practice** (Mohr) Th 6-9 \$24 and \$5 laboratory fee p. 126
360. **Portrait Photography** (Towles) F 6-8 \$16 and \$4 laboratory fee p. 126

**Courses are open to non-Federal employees
insofar as facilities permit**

Spring Semester

February 2 through May 14

Schedule of Classes available January 2

velop a well balanced understanding of the principles, techniques, and administrative aspects of O&M work. The courses are designed for students with varying degrees of experience in this field.

555. Principles and Techniques of O&M Work

Year, 2 credits each semester

WILLIAM A. GILL and WILLIAM R. DIVINE

Deals with the principles and techniques employed in surveying and analyzing organization and methods problems and in formulating solutions for such problems. Emphasizes: planning and conducting various types of surveys; organizing and presenting survey facts; forms analysis; establishing effective relationships; the human element in O&M work; ways of dividing work and controlling work flow; presenting recommendations; installing new methods; follow-up. *Prerequisite:* Applicants will file at the time of registration a statement of their reasons for taking the course. Preference will be given to those engaged in O&M work; registration will be accepted from those not now engaged in O&M work and such persons will be admitted insofar as facilities permit.

Office Management

(See p. 54)

780. Establishing and Administering O&M Work

Year, 2 credits each semester

HAROLD A. STONE and JOSEPH P. LOFTUS

Deals with the problems of establishing and administering O&M work. Planning and conducting surveys; controlling survey operations; selecting staff; selling recommendations; establishing an O&M unit; responsibilities and authorities of an O&M unit; relationships within and without a bureau, department, and the Government; scope of O&M work; pitfalls to be avoided; control and management of administrative issuances and related topics. Emphasis is placed upon different sets of circumstances encountered in O&M work. Cases are presented both by the students and the instructors. This course is designed for persons who wish to expand their knowledge of the *administrative phases* of O&M work. It is essential therefore that they have previous education or experience or both in the practical application of its techniques. *Prerequisite:* Completion of courses in O&M techniques in a recognized school and consent of instructor, through Graduate School office.

519. Work Measurement and Performance Standards

Fall, 2 credits. Repeated in Spring

I. THOMAS MCKILLOP and SPECIALISTS

Scientific management principles and their application to the work measurement problems of industry and Government; analysis and standardization of work; time and motion study; work measurement as it relates to production planning, production control and cost control; comparison of industrial techniques of work measurement with current Government programs. Case studies are presented to illustrate the problems encountered in a work measurement program designed to meet current Government requirements. *Prerequisite:* Practical working experience at grade CAF-7 or above, or permission of instructor.

Writing Procedures and Instructions

(See p. 54)

Statistical Analysis in Industrial Research

(See p. 45)

Organization and Methods Clinic

I. THOMAS MCKILLOP, Coordinator

Private firms have a wide range of sources to which they may turn for consultation on special problems in the field of organization and methods work. Opportunities for governmental organizations to obtain similar aid are more limited. To help meet this need and to encourage the understanding and ap-

plication in the Federal service of effective organization and methods work, the Graduate School provides this Organization and Methods Clinic for those desiring individual consultation and guidance on specific projects in this field.

Each person participating works on an individual basis under the guidance of an expert whose field of specialization is that of the project in question. The consultant will not conduct a survey for the person seeking help, but rather will suggest alternative ways of solving the problem. The clinic affords the O&M analyst an opportunity to have the soundness of his own solution to a problem checked by a disinterested specialist. Personal problems are excluded. Occasional group meetings of those dealing with similar problems may be held where such a step promises to contribute to effective work on individual case problems and is desired by participants.

The clinic is equipped to handle a broad variety of consultative problems. A resource panel of experts has been developed consisting of the staff of this division and other specialists in O&M work throughout Government.

Those interested in using the Clinic may register at any time. The service is restricted to persons carrying responsibility in organization and management work or carrying responsible staff or line functions. There are no fees involved.

DIVISION OF FINANCIAL AND BUDGETARY ADMINISTRATION

Managing Personal Finances.

(See p. 98)

525. Financial Organization and Procedures of the Federal Government

Fall, 2 credits

CARL W. TILLER

A comprehensive summary presentation of Federal fiscal administration, presented primarily on a lecture basis, and including review of the roles of major participants in Federal financial administration: Treasury, GAO, Congressional Committees, Bureau of the Budget, and operating departments. Designed to provide an understanding of the financial organization and procedure of the Federal Government, including such subjects as the Government fund and account structure, and its revenue structure and administration. An orientation course for persons working in some part of the area of financial administration, such as budgeting or accounting, and for potential general or program administration, and others not employed in financial administration. *Prerequisite:* Open, without restriction, but catering in part to desires of budget-staff persons for broader orientation in Federal financial structure and procedure.

635. Agency Budgetary and Financial Administration: Budget Formulation

Fall, 2 credits

RALPH ROBERTS, WILLIAM A. JUMP and STAFF

First part of an advanced, two-semester program for experienced budget-staff personnel. Covers the broad phases of budgetary and financial administration in the Federal Government primarily from the standpoint of the operating department.

The course deals with the pre-appropriation phases of budgeting, including formulation, review, and congressional enactment of the budget. Topics discussed include: the role of budgeting in program formulation; the role of bureaus, departments, Bureau of the Budget, the President and Congress in budgeting; content of the budget and of departmental estimates and related budgetary materials; the investment and capital-outlay budgets; review and analysis of budget estimates; budget justification; legislative-administrative relationships in budgeting. *Prerequisite:* One of the following: Course 344 or 525 in Public Administration; Federal Budgetary Procedure; experience at a responsible level in budgetary or financial administration; or consent of instructor.

Federal Budgetary Procedure (See p. 52)**636. Agency Budgetary and Financial Administration: Budget Execution**

Spring, 2 credits

RALPH ROBERTS, WILLIAM A. JUMP and STAFF

This is the second part of an advanced two-semester course covering the broad phases of budgetary and financial administration in the Federal Government. Several officials from bureau and department budget offices and other budgetary and financial organizations lecture and lead discussions.

This semester deals with the execution of the budget after it is enacted by Congress and the relationships of administrative planning and control, accounting, auditing, and financial reporting to budget execution. *Prerequisite:* One of the following: Course 344 or 525 in Public Administration; Federal Budgetary Procedure; experience at a responsible level in budgetary or financial administration; or consent of instructor.

Mathematics of Finance (See p. 83)**Federal Accounting Procedure** (See p. 51)**Federal Payroll Procedure** (See p. 52)**Federal Government Accounting** (See p. 83)**Advanced Federal Auditing Procedure** (See p. 51)**Public Finance and Taxation** (See p. 90)**Seminar in International Financial and Trade Policies** (See p. 91)**Agricultural Finance** (See p. 94)**Seminar in Agricultural Finance** (See p. 95)**DIVISION OF PERSONNEL ADMINISTRATION**

COMMITTEE ON PERSONNEL ADMINISTRATION

H. DEAN COCHRAN (Chairman)

JAMES L. BUCKLEY, LL.B., Assistant Director,
Office of Personnel, USDAVIRGIL L. COUCH, B.S., Chief, Personnel Division,
Farmers Home Administration, USDAWILLIAM F. HOWELL, M.S., Acting Personnel
Officer, International Bank for Reconstruction
and DevelopmentHAROLD LEICH, A.B., Program Planning Assistant,
Program Planning Staff, Administration
Services, Civil Service CommissionARTHUR B. McLEAN, M.S., Director of Personnel,
Federal Security AgencyRICHARD O. NIEHOFF, Ph.B., Assistant to the
General Manager, Atomic Energy CommissionROSS POLLOCK, M.A., Assistant Chief, Examining
and Personnel Utilization Division,
Civil Service CommissionO. GLENN STAHL, Ph.D., Deputy Director of
Personnel, Federal Security AgencyJOSEPH E. WINSLOW, Adviser on Personnel
Management, Division of Administrative
Management, Bureau of the Budget**561. Public Personnel Administration**

Fall, 2 credits. Repeated in Spring and Summer

O. GLENN STAHL

Designed for those in junior personnel staff positions desiring a broad understanding of personnel administration, for those desiring to enter the field and who need foundation for the more specialized courses in the personnel field, and for supervisors and administrators wishing to have general familiarity with personnel work. Personnel problems which arise when people are associated to-

gether in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities, with respect to personnel administration, of the supervisor and the personnel officer; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship to overall management. *Prerequisite:* One of the following: Introduction to Public Administration; Course 108 or 114 in the Department of Office Techniques and Operations; Grades CAF-4 or above in personnel work; 60 semester hours of college work.

Advanced Federal Personnel Procedure (See p. 53)

General Sociology (See p. 112)

530. Selection and Placement

Fall, 2 credits

ARTHUR B. McLEAN

Recruiting, evaluation, probation, placement, and promotion of employees, with special reference to the Federal civil service; lectures and discussions. *Prerequisite:* One of the following: Course 344 or 561 in Public Administration; Grade CAF-4 or above in personnel work; 60 semester hours of college work.

Principles of Interviewing (See p. 111)

Social Psychology (See p. 110)

629. Tests and Measurements

Fall, 2 credits

JOHN B. CARROLL

Designed for students interested in the application of psychological tests, rating scales, interviews and other devices in modern personnel administration. Topics covered: the theory of measurement; reliability and validity of measuring devices; construction, use and interpretation of tests; types of aptitude, achievement and personality tests; and the use of rating scales and standardized interviews. *Prerequisite:* A course in general psychology and one in statistics, or the equivalent as approved by the instructor.

Elementary Statistical Analysis (See p. 43)

559. Position Classification

Fall, 2 credits. Repeated in Spring and Summer

ROBERT L. HILL and WILLIAM C. LAXTON

An introductory course designed to give the student an understanding of the fundamental concepts of position classification and its uses; the relation of classification to compensation and other phases of personnel administration; the historical background of position classification in the Federal service; an analysis of the Classification Act of 1923 and its amendments and its relation to other personnel processes; position analysis and factors to be considered in the allocation of positions. *Prerequisite:* One of the following: Courses 344 or 561 in Public Administration; Grade CAF-4 or above in personnel work; 60 semester hours of college work.

643. Advanced Position Classification

Fall, 2 credits. Repeated in Spring

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

A study of the practical administration of the Federal classification plan. Emphasis will be placed on the actual methods, policies, and practices that in-

fluence allocation of positions. Specific positions and their allocation factors will be discussed. *Prerequisite:* A course in Position Classification or experience in position analysis.

[720.] Seminar in Advanced Position Classification (1948-49 and every third year)

JAMES L. BUCKLEY

640. Veterans Legislation and Administration

Fall, 2 credits. Repeated in Spring

J. E. LOGGINS and SPECIALISTS

Designed especially for those interested in matters concerning veterans of our armed forces. Consists of comprehensive study of legislation enacted for the benefit of those persons, and their dependents and survivors, who have served in the armed forces of the United States of America. Encompasses in scope the origin and evolution, to the present time, of this class of legislation, including the organization, functions, and regulations of the various agencies charged with the duty of administering this legislation and their interpretations and rulings. The filing, development, perfection, adjudication and review on appeal of claims for hospital treatment, out-patient medical treatment, domiciliary care, re-instatement and maintenance of insurance, disability and death insurance benefits, veterans preference in employment, financial loans, unemployment allowances, burial allowances, retirement of officers, vocational rehabilitation, education and training and disability and death compensation and pension. *Prerequisite:* College graduation, or responsible administrative or supervisory experience, or permission of instructor.

305. Fundamentals of Accident Prevention

Fall, 2 credits. Repeated in Spring JOHN H. WETZEL and ROBERT L. JENKINS

Designed for those in junior staff positions desiring a broad understanding of accident prevention, for those desiring to enter the field who need a foundation for the more specialized courses in accident prevention, and for supervisors and administrators wishing to have general familiarity with accident prevention work. Covers basic approaches to accident prevention; division of responsibilities; technical, economic and social aspects of the accident problem; organization and mechanics of an accident prevention program; and established techniques for reducing accidental wastes in all work programs.

535. Safety Engineering I: Technical Functions

Fall, 2 credits (every third year)

JOHN H. WETZEL and ROBERT L. JENKINS

The broad principles and phases of safety engineering. An elementary course for technically trained personnel. Includes the engineering approach to solution of accident problems; technical aspects of coordinating the safety objectives and activities of management, engineering and operations; and practical application of safety standards to design, planning and operating methods. *Prerequisite:* Fundamentals of Accident Prevention or degree in engineering or equivalent experience, or consent of instructors.

[536.] Safety Engineering II: Administrative Functions (1948-49 and every third year)

[537.] Safety Engineering III: Design and Planning Functions (1949-50 and every third year)

Modern Engineering Materials

(See p. 119)

620. Training Management

Fall, 2 credits

C. O. HENDERSON

Those who administer or supervise work of organizational units have a direct responsibility for the training of employees under them. This course will provide an opportunity for a study and thorough discussion of this important phase of management. It will include the place of training in management; the elements and principles of learning basic to efficient training processes; setting long-time and immediate programs for training in a unit; provision for training in operations' plans; use of special methods and techniques; types of training; and methods of evaluation of training. *Prerequisite:* Responsible supervisory experience; course in applied psychology is desirable.

Conditions of Personality Growth

(See p. 110)

Psychology of Human Relations

(See p. 110)

633. Employee Relations and Employee Services

Fall, 2 credits. Repeated in Spring

ASTRID W. KRAUS

This course defines the basic content of an employee relations program. Deals with the formulation of employee relationship policies; the development and application of grievance and other appeals procedures; the techniques for sharing information with employees, for handling employee discipline and for assisting supervisors to appraise and deal with employee problems; the provision of essential employee services, such as housing, child care, transportation, recreation, health and educational information, and so forth, necessary to recruit and maintain an adequate work force. Discussion will also be devoted to the relationship of Government as an employer to its employee groups; the history of union-management relationships in the Federal service; present day problems of affiliation, "collective bargaining" and areas of negotiation on policy formulation and settlement of employee grievances. *Prerequisite:* College degree or personnel work at Grade CAF-7 or above or consent of instructor.

Introduction to Sociometry and Psychodrama

(See p. 111)

[658.] Law of Federal Personnel Administration (1948-49 and alternate years)

RALPH F. KOEBEL and RAWLEIGH L. TREMAIN

842. Personnel Division Management

Fall, 2 credits

VIRGIL L. COUCH

Application of subject matter covered in Public Personnel Administration. Full instruction and guidance with reference to establishment and operation of the personnel activity of an agency. Problems of internal management in personnel offices and problems of personnel division organization; operating relationships between the personnel office and other staff and line organizations; means of coordinating the respective phases of personnel operations; budgeting and relative cost of a personnel program; how to influence supervisors and others who must carry the responsibility for supervision as a phase of personnel administration; how to make and issue personnel policy; how to plan personnel programs; how to use technicians, deputies and specialists; and types of organization for personnel administration, such as centralized and decentralized and combination types of organization structure. *Prerequisite:* A course in Public Personnel Administration or employment in personnel work at grade CAF-9 or above; or consent of instructor, such consent being based on a review of the training and experience of the applicants.

[725.] Problems in Federal Personnel Administration
(1948-49 and alternate years)

Social Problems of Administration (See p. 113)

DIVISION OF LEGAL ADMINISTRATION

COMMITTEE ON LEGAL ADMINISTRATION

ASHLEY SELLERS, S.J.D., Attorney at Law (Chairman)

JOHN ANDREWS, LL.B., Chief, Federal State Relations Section, Office of the Assistant Solicitor General, Department of Justice
THOMAS C. BILLIG, S.J.D., Assistant Solicitor, Office of the Solicitor, Department of Interior
JAMES DOYLE, LL.M., Associate Solicitor, Office of the Solicitor, USDA
THOMAS J. FLAVIN, LL.B., Judicial Officer, Office of the Secretary, USDA

RALPH F. KOEBEL, S.J.D., Chief, Research and General Legal Services Division, Office of the Solicitor, USDA
DAVID REICH, LL.B., Special Assistant to the Attorney General, Office of the Assistant Solicitor General, Department of Justice
HOWARD WAHRENBROCK, S.J.D., Assistant General Counsel, Federal Power Commission
WALTER B. WOODEN, LL.B., Associate General Counsel, Federal Trade Commission

Business Law (See p. 83)

[663.] Legal Aspects of Investigation—Criminal Evidence and Procedure

RALPH F. KOEBEL

320. Introduction to Administrative Law and Procedure

Fall, 2 credits

EDWARD C. JOHNSON

The increased complexity of modern society has meant that administrative agencies have played an expanding role in the regulation of life and property. This course studies the law which controls and the law which is made by governmental officers. Material used includes regulations, orders and decisions which will acquaint students with traditional and current developments in administrative law and procedure. Topics covered include: powers and duties of administrative authorities as they relate to private interests; means of enforcing decisions; remedies against official action; legal qualifications for office; legal disqualification of officers; appointment, tenure, removal and compensation of officers; and related matters.

[680.] Administrative Law (1948-49 and alternate years)

ASHLEY SELLERS

Protecting Engineering and Scientific Developments Through Patents (See p. 120)

820. Seminar on Problems of Federal Administrative Regulation

Spring, 2 credits

THOMAS J. FLAVIN

A seminar for advanced students using the case approach to consideration of the Administrative Procedure Act and its application to all areas of Federal regulation covered in that act. *Prerequisite:* Extensive experience in regulatory work, with approval of instructor; or a degree in law, public utilities or public administration.

Regulation of Communication (See p. 107)

Contracts and Specifications (See p. 119)

DIVISION OF PROCUREMENT AND PROPERTY MANAGEMENT

COMMITTEE ON PROCUREMENT AND PROPERTY MANAGEMENT

JAMES SCAMMAHORN, Assistant Director, Office of Budget and Finance, USDA
(Chairman)

SIDNEY ADAMS, LL.B., Administrative Officer,
Bureau of Agricultural and Industrial
Chemistry, Agricultural Research Admin-
istration, USDA

WILLIAM E. FEE, LL.B., Assistant Chief, Ad-
ministrative Services Division, Soil Con-
servation Service, USDA

CLIFTON E. MACK, LL.B., Director, Bureau of
of Federal Supply, Treasury Department

CHARLES E. OFFUTT, Associate Chief, Admin-
istrative Services Division, Budget and
Management Branch, Production and Mar-
keting Administration, USDA

S. A. SNYDER, Deputy Director, Stores Branch,
Bureau of Federal Supply, Treasury De-
partment

RAY WARD, A.B., Chief, Property Management
Program, Bureau of the Budget

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Advanced Federal Purchasing Procedure (See p. 52)

637. Management of Governmental Purchasing

Fall, 2 credits

JAMES SCAMMAHORN

An advanced course designed for employees interested in becoming acquainted with the broad phases of handling and managing Government purchasing activities. Arranged to be especially useful to employees engaged in budget and personnel activities who need some general knowledge of procurement office functions. Deals with purchasing policies, organization and management, finances, and laws governing purchasing. Topics: (1) Organization and management of purchasing offices; (2) organization and management of warehouses; (3) property accounting, management and distribution of supplies and equipment; (4) management and training of purchasing and warehousing personnel; (5) procurement function efficiency determination; (6) importance of project service objective and its relation to good Government purchasing and warehousing; (7) nature of public contracts as compared with private contracts; (8) specification studies including development and writing; (9) delivery requirements, inspection of supplies and liquidated damages; (10) market analysis and conditions which affect seasonal project work of Government bureaus; (11) laws which affect procurement contracts such as Walsh-Healy Act, Davis-Bacon Act, Eight-Hour Law; (12) functions of General Accounting Office, Bureau of Federal Supply, Federal Prisons Industries and surplus disposal agencies in the purchasing scheme; (13) shipping point problems and transportation studies on methods of shipment; (14) new developments in procedures affecting purchasing and dissemination of information to field purchasing units. *Prerequisite:* One of the following: Introduction to Public Administration; Federal Purchasing Procedure; Grade CAF-4 or above in purchasing work; 60 semester hours of college work.

(See p. 119)

(See p. 119)

549. Property Management

Spring, 2 credits

RAY WARD, WILLIAM A. McCUTCHEON and GEITH G. BARR

Designed to furnish persons currently employed in property records and management work an opportunity for upgrading on the job through a short, intensive study of the principles and practices of property records and their management. Persons employed in other administrative work may gain a knowledge and understanding of the significant Federal statutes, administrative orders and other regulatory procedures related to a variety of management

problems which will assist them in becoming overall executives. The Bureau of the Budget is conducting a government-wide property management program; the principles and practices of this program are reflected in this course.

Chief objectives are to acquaint the student with: the essentials of acquiring surplus property and equipment from disposal agencies; sales of property between agencies under the Economy Act; explanation of the utilization, conservation, management and control of property as related to inventory, accountability, record controls and reporting, standards of inspection and maintenance, warehousing, and training of equipment operators; disposition of property, after survey, by donation, sale or exchange; and a general summary of overall property management problems. *Prerequisite:* One of the following: Introduction to Public Administration; Course 108 or 117 in the Department of Office Techniques and Operations; Grade CAF-4 or above in purchasing work; 60 semester hours of college work.

DIVISION OF ACCOUNTING

COMMITTEE ON COMMERCIAL AND GOVERNMENTAL ACCOUNTING

WILLIAM H. ROWE, M.S., Chief, Program Development Division, Federal Crop Insurance Corporation, Production and Marketing Administration, USDA (Chairman)

PAUL L. APPELMAN, Examiner in Accounting,
Civil Service Commission
WARNER H. HORD, M.B.A., Chief, Accounting
and Rates Division, Civil Aeronautics
Board

CHARLES N. MASON, M.A., Assistant Chief,
Budget Division, Budget and Management
Branch, Production and Marketing Admin-
istration, USDA

ROBERT W. MAXWELL, M.A., Commissioner of
Accounts, Treasury Department
HERSCHEL C. WALLING, M.B.A., Principal
Budget Examiner, Bureau of the Budget

The Graduate School is interested in offering accounting courses primarily as a means of training for the *public* service.

The curriculum necessarily includes courses in general accounting because the basic principles are essential for Government accounting. The scope of accounting in the Federal service is wide. There are increasing demands for accountants having a knowledge of commercial as well as Government accounting. These demands have come as a result of the formation of many Government corporations and Federal regulatory agencies. Hence, the accounting program required for a Certified Statement of Accomplishment is broad enough to cover not only the regular appropriation accounting of the Federal Government, but also the accounting training needed for many other governmental activities. The program is comprehensive enough to meet both advanced training for the Government service, and also, if courses are carefully selected, the usual educational requirements for C.P.A. examinations. Students planning to take C.P.A. examinations should know the requirements of the state in which they plan to take the examination. In general, their study, in addition to accounting, should include the following: Principles of Economics, Corporation Finance, Investments, Mathematics of Finance, Business Law, Statistics, Business English, Principles of Marketing and Industrial Management.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ACCOUNTING

Requirements

1. High-school diploma or equivalent.
2. Thirty-six semester hours of credit in courses outlined below and distributed as follows:
 - a. All of the required courses.
 - b. No less than three semester hours credit from the Accounting Elective Courses.
 - c. No less than six semester hours credit from the Related Elective Courses.
 - d. The remaining six semester hours credit may be taken in either of the two elective groups.

REQUIRED COURSES

<i>Accounting</i>	<i>Number of Semesters</i>	<i>Semester Hours Credit</i>
Principles of Accounting	2	6
Second Year Accounting	2	6
Cost Accounting	1	3
Auditing	1	3
Advanced Accounting Problems	1	3

ACCOUNTING ELECTIVE COURSES

Federal Government Accounting	1	3
Federal Tax Accounting	1	3
Analysis and Interpretation of Financial Statements	1	2
Mathematics of Finance	1	3
Federal Accounting Procedure	1	2
Federal Auditing Procedure	1	2
or Advanced Federal Auditing Procedure	1	2
Budgetary and Financial Administration	2	4
Accounting Problems of Regulatory Agencies	1	3
Advanced Accounting Problems (Second Semester) ..	1	3
Accounting Systems	1	3

RELATED ELECTIVE COURSES

Business Law	2	4
Principles of Economics	2	6
Survey of Statistics	1	3
or Elementary Statistical Analysis	2	4
Report Writing or Writing for Official Purposes ..	1	2

Federal Accounting Procedure

(See p. 51)

352^a. Principles of Accounting—First Half

Fall, 3 credits. Repeated in Spring and Summer

WILLIAM L. DYE
HERBERT G. MARSHALL
WILLIAM H. ROWE

Elementary principles of accounting; discussion and problems. At the end of the semester students will be prepared to do the accounting necessary for a small business organization; i.e., keep a complete set of books, draw up statements at the end of the fiscal period, adjust the accounts for accruals, deferred

items, depreciation, etc., and close the books. *Prerequisite:* High school graduation or equivalent.

352b. Principles of Accounting—Second Half

Fall, 3 credits. Repeated in Spring and Summer

WILLIAM L. DYE
HERBERT G. MARSHALL
WILLIAM H. ROWE

Continuation of first half covering more advanced principles of accounting; accounting for partnerships, corporations and manufacturing; depreciation policies and analysis of financial statements. *Prerequisite:* First half or equivalent.

353a. Intermediate Accounting—First Half

Fall, 3 credits

WARNER H. HORD

Advanced principles of manufacturing accounting, corporation accounting, and valuation as applied to current assets, fixed assets, intangibles, and liabilities, reserves and funds, installment sales. *Prerequisite:* A first year course in accounting.

353b. Intermediate Accounting—Second Half

Spring, 3 credits

WARNER H. HORD

Advanced principles of partnership accounting, including formation, operation, and dissolution; joint ventures; consignments; agencies and branches; consolidated balance sheets and income statements; application of funds; accounting for insolvent and bankrupt concerns; estates and trusts. *Prerequisite:* First half or equivalent.

422. Business Law

Year, 2 credits each semester *

ELMER MOSTOW

Aspects of law essential to the conduct of modern business. Forms of business organization, bailments, property, sales, mortgages, negotiable instruments, contracts. *Prerequisite:* Principles of Economics, Intermediate Accounting or equivalent.

423. Mathematics of Finance

Spring, 3 credits

RALPH R. BOTTS

Calculation of compound interest, compound discount, sum of annuities, present value of annuities and perpetuities; accumulation of sinking funds and amortization of debts by installments. Calculation of bond yields, bond values, premiums and discounts. Computation of depreciation by sinking fund method and fixed percentage of book value method. Some study is given to life probabilities and the computation of premiums and reserves for the more common types of life insurance and annuities. Accounting applications and entries will be discussed for those students interested in the accounting aspects.

Financial Organization and Procedures of the Federal Government

(See p. 74)

354. Federal Government Accounting

Fall, 3 credits. Repeated in Spring

CHARLES N. MASON

A review of the development of the accounting system for Federal funds and a detailed study of appropriation, fund, receipts, and governmental corporation accounting. Special emphasis is given to the accounting problems of administrative agencies. The Treasury Department and General Accounting Office relationships to the accounting system are covered. Specialists in their respec-

* This course is so arranged that students may attend both semesters or either semester. No subject matter, however, will be repeated.

tive fields assist in the course. *Prerequisite:* Principles of Accounting or Federal Accounting Procedure, or one year of experience with the Federal system of accounting.

642. Cost Accounting

Fall, 3 credits

ALFRED D'ALESSANDRO

A thorough and comprehensive treatment of the principles of cost accounting, together with the methods of their application to specific problems. By means of lectures, textbook study, and problems, full consideration is given to the methods of cost accounting for materials, labor, direct and indirect expenses in their relationship to specific job orders; process, departmental and standard costs; and the control accounts. *Prerequisite:* Principles of Accounting.

645. Federal Tax Accounting

Fall, 3 credits

EUGENE C. MOYER

Federal taxation presented from the accounting viewpoint. Special attention given to income taxation. *Prerequisite:* Principles of Accounting; accounting experience desirable.

Advanced Federal Auditing Procedure

(See p. 51)

693. Auditing

Spring, 3 credits

JOHN C. COOPER

The purposes and types of audits are studied. Consideration is given to such problems as the planning and performing of audits, principles and auditing of different types of audits, audit working papers and reports, and responsibility of the auditor. *Prerequisite:* Intermediate Accounting.

646. Advanced Accounting Problems

Year, 3 credits each semester (alternate years)

L. W. ACKER

This course is intended primarily to furnish a coverage of miscellaneous accounting problems for general review and partially to serve as C.P.A. examination review. It will include financial statements, municipal (fund) accounting, corporation accounting, partnership accounting; consolidation intercompany accounting; company accounting; accounting theory and other processes of accounting. Second semester emphasis is placed on such subjects as accounting systems, and accounting for management purposes. Principal emphasis in the course will be placed on the working of problems at home and in class. Class discussion of these problems will be held, and loose leaf solutions will be distributed after the problems have been worked and discussed. Supplemental reading on the subject matter of the problems will be done by the student for his own benefit and at his own option. *Prerequisite:* Three years' accounting training. With instructor's permission, however, the course may be taken concurrently with third year accounting.

[647.] Analysis and Interpretation of Financial Statements (1948-49 and alternate years)

L. W. ACKER

[695.] Accounting Systems (1948-49 and alternate years)

Department of Social Sciences

DEPARTMENTAL COMMITTEE

FREDERICK V. WAUGH, Ph.D., Economist, Council of Economic Advisers, Executive Office of the President (Chairman)

FOSTER F. ELLIOTT, Ph.D., Associate Chief,
Bureau of Agricultural Economics, USDA

H. DUNCAN HALL, B.Litt., Director of British
Official Histories (Civilian), North America

PHILIP M. HAUSER, Ph.D., Professor of Sociology,
University of Chicago

SHERMAN E. JOHNSON, Ph.D., Assistant Chief
for Production Economics, Bureau of Agricultural Economics, USDA (Vice-chairman)

JOHN PROVINSE, Ph.D., Assistant Commissioner, Office of Indian Affairs, Department of Interior

HAROLD B. ROWE, Staff Member, Brookings Institution

J. MURRAY THOMPSON, Ph.D., Production and Marketing Administration, USDA

PURPOSE AND SCOPE

Social science deals with people and the problems of human relationships, as contrasted with natural or physical science which deals with things and the problems arising out of physical relationships.

The problems of social organization and operation have become both absolutely and relatively more important with the increase in complexity of our industrial civilization. More and more, people are concerned with the organization of production, the distribution of goods and income, and with price policies. The individual as a consumer and investor, the businessman and the farmer as producers, find increasing need for a knowledge of economics and other social sciences. Large corporations are employing growing numbers of economists to help in the formulation of policy. Psychologists and social workers are finding a demand for their services in personnel work. And, the large number of Federal, state and local government agencies need more people adequately trained in social science.

Social science is divided into a number of closely allied fields including economics, sociology, political science, history, law, and psychology. A broad grasp of any one of these subjects implies at least some familiarity with the others, because of the many interrelationships among these studies. Yet the continued development of each social science has given rise to larger and still larger bodies of knowledge relating to it, until only through a considerable degree of specialization can the student hope to master any one part. Thus the great need is for people who have concentrated sufficiently on one phase of a social science, such as marketing in economics, to be thoroughly familiar with the details of fact and principles involved, yet who also have a broad underlying training in the allied fields.

The courses offered by the Graduate School are designed to aid in acquiring a general background in the social sciences, as well as the specialized training in particular fields which is necessary for successful work in many Government departments and in private business. Some courses are included that are of interest outside of a person's field of work or specialization. For example, a course in the Psychology of Human Relations is of interest to all persons who desire a better understanding of human behavior as a basis for their day to day contacts with other people. A course in Managing Personal Finances will be useful to persons who are faced with problems of owning a home, investing current savings, or making decisions with respect to the type of life insurance best suited to their special needs.

But not all of those engaged in occupations connected with the social sciences can hope to attain a complete general as well as specialized background, at least for some time to come. They will be interested, rather, in courses designed to fit them better for doing some specific job which is not connected with research, policy formation or general administration. An employee in the personnel office of a Department of Agriculture branch responsible for market news and inspection services may wish to take a course in marketing in order to learn something about the subject matter dealt with by the personnel of the branch, or a course in psychology as an aid in dealing with the personal problems which are daily presented to employee counselors. The secretary to an economic research director may want a course in the principles of economics in order to become familiar with the terminology and general economic concepts to which her stenographic and filing duties relate. An almost unending array of job needs of this kind offers opportunities to the alert and ambitious employee to increase his capacity and usefulness to his employer. The many promotions within the Government service which can be traced directly to such training testify to the fact that study in the social sciences is profitable.

GROWING NEED FOR TRAINED WORKERS

It is extremely important that Government policies, relating to the economic and social life of the Nation, be based on competent studies of the probable effects of alternative lines of action. To forecast accurately what will happen and to point out clearly the good and bad effects which may result from any proposed course of action is the major service which social scientists may render to the people of this country.

Washington is an excellent place to study problems of this kind. The principal Federal programs in the economic and social fields

are administered in Washington and new proposals constantly are being considered both by the Congress and by the agencies responsible for the administration of those programs. Moreover, Washington is growing in importance as a center for the discussion and actual administration of international programs.

SUGGESTIONS FOR PROGRAM OF STUDY

To meet the specific needs of students who have different educational and experience backgrounds and different immediate interests, the Graduate School has developed the following types of courses in the social sciences:

- (1) *Courses of General Interest.* Several of the social science courses are designed to provide information of general interest to a large group of persons who desire to broaden their background along certain lines. Some of these courses have been developed to meet the needs of persons who do not expect to become specialists in a particular field, but who desire to obtain some background in a subject, as a basis for work in related fields, or purely as a personal interest. The courses that meet the general interest needs of students are usually not of graduate level.
- (2) *Undergraduate Basic Courses.* These courses are designed to provide a basic social science background for students who have not completed their undergraduate training or who have not had an opportunity to take the basic background work in economics and the other social sciences as a part of their qualification for Bachelor's degree work. These courses provide an opportunity for persons who enter the Government service in the lower grades to prepare themselves for professional advancement.
- (3) *Graduate and Advanced Undergraduate Courses.* These courses offer work of graduate level but they are also open to undergraduates of advanced standing. Students who are registered for graduate credit will be expected to do more work in these courses than those who register for undergraduate credit.
- (4) *Strictly Graduate Courses.* These courses are offered only for graduate students who have adequate background. They are usually conducted on a seminar basis and they require a great deal of participation and preparation of material by the students themselves.

The Graduate School does not offer either undergraduate or advanced degrees, but it is possible for a student who is interested in working toward a degree to organize his work in the Graduate School in such a way that he will fulfill some of the requirements of the institution where he expects to obtain a degree. If possible, the course of study should be outlined in consultation with advisers at the institution where the student expects to take his degree. Students who have not decided on the institution where they expect to complete their work but who wish to specialize in economics or in one of the other social sciences should select basic courses leading toward degree work, in consultation with designated advisers of the Graduate School.

Basic Undergraduate Courses for a Major in Economics. Students working toward a Bachelor's degree with specialization in economics should plan to complete the following courses either in the Graduate School or at some other institution:

- | | |
|------------------------------------|----------------------|
| 1. Principles of Economics | 3. Economic History |
| 2. Elementary Statistical Analysis | 4. Money and Banking |
| 5. Public Finance | |

In addition to these courses, the students looking forward to concentration of work in agricultural economics should plan to complete undergraduate courses in Economics of Marketing and Economics of Farm Production. An elementary course in accounting should also be included if the student plans to major in prices and marketing. Undergraduate students who expect to major in one of the other social sciences should consult designated advisers in the Graduate School.

Graduate Courses. Students working for graduate degrees should consult educational advisers in the institution where they expect to receive their degree. If they have not selected such an institution they should confer with advisers in the Graduate School who are teaching in the particular field in which they expect to concentrate. In general, students who wish to map out a course of study leading toward a graduate degree should plan their work along the following lines:

- (1) Completion of basic undergraduate courses.
- (2) Advanced courses in social science fields related to the particular field of concentration. For example, a student majoring in economics should consider advanced courses in statistics, economic history, sociology or some other related field in order to broaden his educational background.

- (3) Advanced courses in the field of concentration. Students who expect to major in one of the social science fields should begin their graduate work by taking the basic graduate courses in that special field. For example, students who expect to major in any field of economics should plan to take at least six credits of work in advanced economic theory and six credits in monetary and cycle theories. With these courses as a foundation, the student can begin to specialize in courses in his particular field of concentration.

DIVISION OF ECONOMICS

GENERAL ECONOMICS

COMMITTEE ON GENERAL ECONOMICS

MORDECAI EZEKIEL, Ph.D., Economist, Food and Agriculture Organization of the United Nations (Chairman)

H. M. DOUTY, Ph.D., Chief, Wage Analysis Branch, Bureau of Labor Statistics, Department of Labor

EVERETT E. HAGAN, Ph.D., Chief, Group A, Fiscal Division, Bureau of the Budget

PHILIP M. HAUSER

HOWARD S. PIQUET, Ph.D., Senior Analyst in Foreign Trade, Legislative Reference Service, Library of Congress

STEPHEN RAUSCHENBUSH, B.A., Consultant on International Resources, United Nations

MARGARET G. REID, Ph.D., Head, Family Economics Section, Research Division, Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, USDA

Adequate foundation training in general economics is essential for satisfactory accomplishment in the study of any specialized branch of the subject. Hence, the primary objective in developing the following list of courses has been that of providing the basic work needed, by students who wish to carry out a systematic plan of study, at both undergraduate and graduate levels. In addition, a course on research methods is listed under this head. It is of general interest to students majoring in economics.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

—O—

110. Introductory Survey of Economics

Summer, 2 credits

BUSHROD W. ALLIN

A refresher course for those for whom a lapse of time has intervened since taking a more complete course in principles and who wish to review the basic principles. Also for those interested in becoming acquainted with the nature and general content of economics as a science and a profession.

200. Introduction to Economics, Theory and Institutions

Fall, 2 credits

BUSHROD W. ALLIN

This course is largely a study of the place of collective action in economic theory. Institutions are defined as collective action in control of individual action. These take the forms of corporations, trade unions, farm organizations and decisions of the Supreme Court. Theory is interpreted as referring to mental tools useful for understanding and dealing with contemporary economic and social problems.

201. Principles of Economics

Year, 3 credits each semester

ROY J. BURROUGHS

An examination of the nature, validity, and significance of the fundamental principles of economics. Designed to give the student the understanding of basic concepts necessary for advanced study in the field of economics and for the better understanding of materials dealt with in applied courses. The relation between economic theory and scientific methods. The organization of the economic system: production, consumption, exchange, and the distribution of income and wealth. The relation between economic institutions and so-called economic laws. Although the significance of basic principles will be interpreted in relation to current events and problems, the course is primarily designed to furnish an understanding of the scientific aspects of economics which have continuing application under changing world conditions.

418. Public Finance and Taxation

Spring, 2 credits

TYLER F. HAYGOOD

Government revenues, expenditures, debts, financial administration and fiscal policy; taxation; equity in distribution of tax burdens, shifting and incidence of taxation; types of taxes, excise, income, property, excess profits, etc. *Prerequisite:* A course in economics.

Financial Organization and Procedures of the Federal Government

(See p. 74)

[610.] Advanced Economic Theory (1948-49 and alternate years)**705. History of Economic Thought**

Fall, 3 credits

MAX J. WASSERMAN

The economic theories of the most important schools and economists from Greek antiquity through Alfred Marshall (1895). The schools covered are the Greek, Medieval Period, Mercantilism, Physiocrats, the Classical School, Socialism of 1848, Historical School, Psychological School and the Neo-Classical School. The theories studied are projected against the factual and philosophical background of the period. *Prerequisite:* Principles of Economics or equivalent.

741. Contemporary Economic Thought

Spring, 3 credits

BUSHROD W. ALLIN

A review of the ideas of the leading economic theorists of the past fifty years, including those of Marshall, Veblen, Commons, Mitchell and Keynes. *Prerequisite:* Principles of Economics or equivalent.

[711.] Imperfect Competition and Public Regulation (1948-49 and alternate years)

GARDINER C. MEANS

703. Modern Theories of Business Fluctuations

Spring, 2 credits

WILLARD W. COCHRANE

Modern theories of employment, output, and prices, including those of Hansen, Keynes, Robertson, Lange, and the Stockholm group, are analyzed with some attention given to the early development of these theories together with their present day criticisms. The theories of each school are analyzed with respect to (1) inner consistency, and (2) contribution to an explanation of variations in the level of employment, output, and prices in the operating economy. A synthesis of the theories listed and the possibility of effecting a fusion with "orthodox" economic theory are explored, and policy implications examined. *Prerequisite:* A course in money and banking at the advanced undergraduate level and a course in advanced general economics, or equivalent as approved by the instructor.

528. International Financial and Trade Policies

Fall, 2 credits (alternate years)

OSCAR ZAGLITS

The course analyzes patterns and problems of international commercial and financial policy. Discussion of the arguments for and against free trade is combined with analysis of the economic effects of the various forms of government intervention in international trade and finance, such as: import and export tariffs, tariff preferences, quotas and other quantitative trade restrictions, currency manipulations, and exchange controls. Particular attention is given to the efforts now underway to restore international monetary stability and promote the expansion of world trade and employment, and to the general character and tasks of the international institutions dealing with these problems. *Prerequisite:* A course in principles of economics or equivalent.

728. Seminar in International Financial and Trade Policies

Spring, 2 credits (alternate years)

OSCAR ZAGLITS

The seminar is designed to discuss, at an advanced level, (1) current international economic problems and policies; and (2) specific objectives, organizational structure and prospective policies of such existing or proposed institutions as the Export-Import Bank, the new International Bank for Reconstruction and Development, the International Monetary Fund, the Food and Agriculture Organization, the proposed International Trade Organization, the Social and Economic Council of the United Nations, and agencies for the control of international commodity agreements and international buffer-stock operations. *Prerequisite:* International Financial and Trade Policies, or equivalent graduate training.

704. Economic Theory of International Trade

Year, 2 credits each semester

H. J. WADLEIGH

The classical and neo-classical theories of international trade and finance as developed by Ricardo, Taussig, Ohlin and others, with applications to current international economic problems. *Prerequisite:* Training in economics or equivalent in general experience as approved by instructor.

Seminar in National and International Policies Affecting Agriculture

(See p. 104)

402. Measurements of Economic Activity

Spring, 2 credits

LOUIS H. BEAN

Designed especially for the Washington area where many people are engaged in studying and interpreting economic activity. Measures of such activity include measures of employment and unemployment, wages and hours, monetary statistics, price indices, production indices, and the national income and its components. It is not the purpose of the course to cover in detail the technical problems involved in computing these various measures but rather to acquaint

the student with the concepts underlying them and their limitations and interrelations, so that he would be able to utilize them effectively and interpret them correctly. *Prerequisite:* Principles of Economics and a course in statistics.

712. Research Methods in Social Sciences

Spring, 2 credits

O. C. STINE and SPECIALISTS

Designed primarily for specialists who are engaged in social science research. The aim is to suggest scientific standards for research in the social sciences and to acquaint workers in the several fields with recognized basic principles of scientific methods in the allied fields. *Prerequisite:* Training at least equivalent to the requirements for graduation with a major in one social science field, including statistics.

Sampling in Social and Economic Surveys (See p. 46)

Interview Survey Techniques in the Social Sciences (See p. 46)

Statistical Methods for Research Workers (See p. 46)

AGRICULTURAL ECONOMICS

COMMITTEE ON AGRICULTURAL ECONOMICS

SHERMAN E. JOHNSON (Chairman)

HAROLD HEDGES, M.A., Chief, Cooperative Research and Service Division, Farm Credit Administration, USDA

HAROLD B. ROWE
J. MURRAY THOMPSON

ORIS V. WELLS, B.S., Chief, Bureau of Agricultural Economics, USDA

BENNETT S. WHITE, Ph.D., Acting Chief, Division of Marketing and Transportation Research, Bureau of Agricultural Economics, USDA

The great importance of enlarging and improving knowledge of the economics of agriculture is generally recognized. Constructive accomplishment in this field requires thorough training in economics combined with a comprehensive grasp of its application to the special conditions of agriculture. Such a balanced combination can best be achieved by following a systematic course of study appropriate to the particular area of concentration desired. The courses offered by the Graduate School permit students to carry out such plans of study with concentration in the economics of agricultural production, agricultural finance, prices, and marketing. The electives and general interest courses provided also permit the adaptation of study plans to meet the special interests of individual students.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

The Graduate School offers a Certified Statement of Accomplishment to students who have completed 30 credits of graduate work in agricultural economics, including the basic graduate courses in economics. To qualify, it is necessary to follow the specific se-

quence of courses that are listed for three fields of concentration indicated below.

The Certified Statement of Accomplishment is not an advanced degree, but it constitutes evidence of completion of an organized course of study in the field of agricultural economics. It is a certification that the student has completed a program of study which prepares him for effective public service in agricultural economics work. The Graduate School plans to extend the granting of Certified Statements of Accomplishment to other social science fields as there is sufficient demand.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

(With Concentration in Specified Fields of Application)

Economics of Production

Agricultural Finance

Prices and Marketing

BASIC UNDERGRADUATE COURSES

Required foundation courses. Carry undergraduate credit only and may not be used to meet the credit hour requirement for the certified statement. Equivalent courses will be accepted by transcript from other institutions.

The number in parenthesis after course title indicates semester hour credits.

Principles of Economics (6)	Principles of Economics (6)	Principles of Economics (6)
Elementary Statistical Analysis (4)	Elementary Statistical Analysis (4)	Elementary Statistical Analysis (4)
Economics of Farm Production (3)	Economics of Farm Production (3)	Economics of Farm Production (3)
Introduction to Marketing (3)	Introduction to Marketing (3)	Introduction to Marketing (3)

REQUIRED BASIC GRADUATE COURSES

Advanced Economic Theory (6)	Advanced Economic Theory (6)	Advanced Economic Theory (6)
Modern Theories of Business Fluctuations (2)	Modern Theories of Business Fluctuations (2)	Modern Theories of Business Fluctuations (2)

REQUIRED SPECIALIZED GRADUATE COURSES

Farm Management (4)	Agricultural Finance (3)	Economics of Marketing (4)
or Land Economics (4)		
Seminar on Agricultural Policies (2)	Farm Management (4)	
	or Land Economics (4)	
Seminar in Economics of Production (3)	Seminar in Agricultural Finance (3)	Seminar on Agricultural Policies (2)
		Seminar in Marketing (3)

ELECTIVE GRADUATE COURSES

Select courses in consultation with Graduate School advisers to complete the 30 graduate credits required for certified statement of accomplishment.

ECONOMICS OF PRODUCTION AND AGRICULTURAL FINANCE

205. Introduction to Farming

Spring, 3 credits (alternate years)

HARRISON M. DIXON and STAFF

The organization and operation of farms. Designed to provide background for men and women in both CAF and P services, particularly in the Department of Agriculture, who need to know more about farming to carry out their assign-

ments most effectively. Includes tours to Beltsville, University of Maryland and some privately operated farms.

Soil Conservation

(See p. 62)

Soil Fertility and Management

(See p. 62)

[207.] Economics of Farm Production (1948-49 and alternate years)

WINN F. FINNER

[409.] Farm Management (1948-49 and alternate years)

WYLIE D. GOODSSELL assisted by CARL P. HEISIG and H. L. STEWART

410. Land Economics

Year, 2 credits each semester (alternate years)

V. WEBSTER JOHNSON

A survey of economic principles governing utilization of major land types, including an appraisal of present land resources and future need for various types of land and land uses; traditional practices and customs that affect land use; private and public land ownership and tenancy relationships; problems of new settlement; land income under different conditions of ownership and management; and various state and local measures for the direction and control of land use and occupancy.

411. Agricultural Finance

Fall, 3 credits

DONALD C. HORTON

Influence of the economic characteristics of different types of farms on their capital requirements; sources of agricultural capital—operator, landlord, and creditor investment; complementary and competitive relationships among farm credit institutions and other sources of agricultural capital; problems of institutions extending credit to agriculture; application of general principles of financial management to the farm business. *Prerequisite:* Economics of Farm Production or a course in Money and Banking.

[412.] Risk and Insurance (1948-49 and alternate years)

WILLIAM H. ROWE

720. Seminar in Economics of Production

Spring, 3 credits (alternate years)

SHERMAN E. JOHNSON and ASSISTANTS

A seminar dealing with special problems in the broad field of economics of production. Students will be expected to prepare papers on problems of interest in their special fields. Different research workers and administrators participate in the discussion of current problems under the guidance and coordination of the instructor. *Prerequisite:* Background of graduate work and approval of instructor.

Seminar on Agricultural Policies

(See p. 96)

Design and Analysis of Complex Experiments

(See p. 45)

[719.] Seminar in Policy Problems in Resource Utilization, Development and Conservation (1948-49 and alternate years)

EDWARD I. KOTOK, V. WEBSTER JOHNSON and MARK L. NICHOLS

721. Seminar in Agricultural Finance

Spring, 3 credits (alternate years) NORMAN J. WALL and RUSSELL C. ENGBERG

A seminar dealing with the policies, programs and functions of private, quasi-public and public credit agencies; appraisal how adequately credit needs are being met; new developments in financing agricultural production and marketing. *Prerequisite:* Background of graduate work and approval of instructor.

PRICES AND MARKETING**203. Introduction to Marketing**

Fall, 3 credits (alternate years)

BENNETT S. WHITE

A preliminary course intended to provide orientation for the study of marketing as (1) a type of production which supplies essential services, and (2) a valuation process in which the prices of agricultural commodities are established. Marketing machinery costs, functions, methods and practices are surveyed. Marketing specialists of the Department of Agriculture will lead discussions relating to particular commodities and special problems. *Prerequisite:* Principles of Economics or the equivalent.

414. Economics of Marketing

Year, 2 credits each semester (alternate years)

H. M. SOUTHWORTH

An advanced course in which economic aspects of marketing agricultural commodities are systematically analyzed, with main emphasis on applying modern economic concepts to the successive problem areas developed. The first semester considers marketing, including transportation, storage, processing, and distribution, as a process of production. It explores the use of resources in this production, the effects of market institutions and organizations upon the use of resources and the productive services performed, and the criteria of efficiency of this productive process and of public policy designed to improve it. The second semester considers the market as a mechanism for establishing prices. It explores the functions of market prices, the process of price-making, the effects of market organization and practices, and the relationships between margins and the costs of productive services in marketing, and the criteria of efficiency in price-making and of public measures that regulate or intervene in the price-making process. *Prerequisite:* General background in economics, and Introduction to Marketing or its equivalent as approved by instructor.

World Agriculture

(See p. 104)

Modern Theories of Business Fluctuations

(See p. 91)

530. Methods of Price Analysis

Year, 2 credits each semester

RICHARD O. BEEN and ROBERT M. WALSH

A general survey of the main price problems in agriculture and in marketing and consumption of farm products; a critical analysis of recent developments in economic theory and in statistical techniques and their use to measure the effects of various factors influencing prices; and a study of the accuracy and usefulness of price forecasts. Special attention will be given to Government price, production and marketing programs; to speculation and futures trading; and to trade practices and market organization as they affect the prices of farm products at various stages in the marketing process. Emphasis will be placed on developing proficiency in application of price analysis methods. *Prerequisite:* Principles of Economics and a course in elementary statistics which has included correlation analysis. Course may be entered second semester with instructor's consent.

[722.] Seminar in Marketing (1948-49 and alternate years)

FREDERICK V. WAUGH

750. Seminar on Prices

Spring, 2 credits (alternate years)

ORIS V. WELLS

For advanced students professionally interested in analysis of the determination and behavior of agricultural prices. Chief emphasis is placed on price research and its application to agricultural policy. Includes price spreads, margins, and charges for agricultural commodities and associated services. Credit will be awarded on the basis of papers submitted on the special subjects approved at the time of registration. *Prerequisite:* Graduate work in economics of marketing or comparable experience as approved by instructor.

AGRICULTURAL POLICY**[407.] History of Agricultural Policy in the United States Since the Colonial Period (1948-49 and alternate years)**

EVERETT E. EDWARDS

LECTURES ON AGRICULTURAL PROGRAMS

BY

HEADS OF AGENCIES AND OUTSTANDING SCIENTISTS

WILLIAM A. MINOR AND T. ROY REID, Coordinators

A lecture series for the 1947-48 school year, centering around the major phases and problems of American agriculture. Designed to familiarize members of the Department of Agriculture with current developments in representative program areas. No registration will be required and no fees charged. Lectures will be given at 4:30 in the Jefferson Memorial Auditorium. A special announcement of each lecture in this series will be made internally in the Department of Agriculture. While these lectures are designed primarily for Department of Agriculture employees, others interested in these topics may make arrangements to attend through the Registrar's office.

The Policies and Inter-Relations of the Great Powers—U.S.A., British Commonwealth, and U.S.S.R.

(See p. 105)

Seminar in National and International Policies Affecting Agriculture

(See p. 104)

416. Agricultural Cooperation

Spring, 3 credits (alternate years)

HAROLD HEDGES and A. REX JOHNSON

Discussion of the philosophy and economic concepts of the farmer cooperative movement; a review of its history and development; analysis of legal phases and of organizational and financial structures; evaluation of major cooperative developments in the fields of marketing, purchasing and farm services; and appraisal of its future role in American agriculture. *Prerequisite:* Introduction to Marketing or equivalent.

Consumer Cooperation

(See p. 98)

716. Seminar on Agricultural Policies

Year, 1 credit each semester

WILLIAM A. MINOR and ORIS V. WELLS

A thorough and practical analysis and evaluation of the major components of current agricultural problems and policies. Discussion of some of these will

be presented by persons carrying major responsibilities for the areas in question. These presentations will be woven into, and major emphasis will be placed upon, a developmental exploration of agricultural problems and policies. *Prerequisite:* Master's degree in economics, or equivalent in another field or in experience as approved by instructors.

718. Seminar in Rural Social Policies

Spring, 2 credits (alternate years)

T. J. WOOFER

This seminar analyzes and evaluates Government welfare policies in the United States and other countries. Attention is centered primarily on such measures as social security for rural people, rural housing programs, measures aimed at improving health and medical facilities in rural areas, tenure, improvement, and similar welfare programs. Emphasis is given to the need for and the economic effects of policies of this general nature. *Prerequisite:* Master's degree in economics or sociology or permission of the instructor.

EXTENSION WORK

[450.] Extension Education

FREDERICK P. FRUTCHEY

700. Basic Evaluation Adapted to Extension Teaching

Schedule to be announced, 3 credits

LAUREL K. SABROSKY and SPECIALISTS

Steps and techniques involved in adapting the principles of evaluation to Extension field studies, including defining of objectives, determination of the population and sampling techniques, selection and construction of measuring devices, tabulation, analysis, and interpretation of data collected; need for evaluation in Extension teaching; contribution of evaluation to Extension teaching.

701. Research Methods and Techniques as Applied to Extension Work

Schedule to be announced, 1 credit

GLADYS G. GALLUP and SPECIALISTS

Steps involved in planning a study: questionnaire construction; area sampling, as one device for location of people to interview; attitude measurement as used in public opinion surveys; measurement of interests and prediction of success on the job; interpretation of data; graphic presentation of data; writing a report; use of data.

695. Extension Thesis

Fall, 6 credits when approved. Repeated in Spring

M. C. WILSON

An opportunity will be afforded to qualified persons who desire to undertake a study of an agricultural extension problem and to submit a thesis. The amount of credit, to be determined by a thesis committee, will be based upon the nature of the problem, amount of work, and quality of the thesis.

CONSUMPTION ECONOMICS

Consumption economics is concerned with the interrelationships of production and distribution of income with the kind and quantity of consumption goods and their distribution. Special attention is given to conditions that maximize consumer knowledge and freedom of choice and to factors affecting the distribution of consump-

tion goods, especially income and savings and their distribution, place of residence and type of consuming unit and additional factors such as price advertising, standardization and informative labels. Customs, legislation and social organization of various types, and their effect on consumption, receive special attention.

[300.] **Marketing from Consumer's Point of View** (1948-49 and alternate years)

H. M. SOUTHWORTH

325. Managing Personal Finances

Fall, 2 credits. Repeated in Spring

HARALD C. LARSEN, assisted by

RALPH R. BOTTS and RALPH F. KOEBEL

Renting versus owning a home; costs of home ownership; methods and mathematics of financing; characteristics of deed, abstract, mortgage, trust, contract, and notes; financing durable and other consumer goods; sources and costs of consumption credit and installment buying; characteristics of major types of investments, stocks, bonds, debentures, mortgages, notes, savings accounts, and property; provisions for retirement, Federal retirement system and options, social security and other retirement systems. Insurance: choosing a company, features of principal life insurance and annuity contracts, protection versus savings, nonforfeiture privileges, settlement options, and property, liability and other insurance programing. Planning and administration of estates, joint ownership, laws of intestacy, making a will, administration of estates as executor or administrator, proof of will, costs and fees.

Business Mathematics

(See p. 51)

[419.] **Standards of Living** (1948-49 and alternate years)

ISABELLE M. KELLEY

The Planning of Statistical Surveys

(See p. 45)

521. Economics of Food

Fall, 2 credits (alternate years)

MARGARET G. REID

Methods of investigating consumption of foods and adequacy of diets and factors affecting them, including existing and proposed policies. *Prerequisite:* At least 12 hours in economics and 3 hours of statistics, or permission of the instructor.

[422.] **The Economics of Clothing and Textiles** (1948-49 and alternate years)

MARGARET L. BREW

445. Consumer Cooperation

Spring, 2 credits

VALERY J. TERESHTENKO

The role of consumer cooperation in the social and economic life of Europe, Latin America and the United States. Beginning with a brief review of the theory of cooperation, emphasis will be placed on its application in the fields of credit, housing, health, education, etc. Consumer cooperation in Sweden, Switzerland, and Great Britain, credit cooperatives in Germany and India, group health associations in Poland and Yugoslavia and the industrial cooperatives in China will be studied. Emphasis is on cooperatives in countries of primary importance to the United States in this post-war period, and on social implications of consumer cooperation in the post-war economy.

HEALTH AND MEDICAL SERVICES

COMMITTEE ON HEALTH AND MEDICAL SERVICES

RAYMOND C. SMITH, M.S., Assistant Chief for Farm Population, Bureau of Agricultural Economics, USDA (Chairman)

ELIN ANDERSON, M.A., Specialist in Rural Health Services, Extension Service, USDA
NELSON H. CRUIKSHANK, A.B., Director, Social Insurance Activities, American Federation of Labor

FRANZ GOLDMANN, M.D., Clinical Professor of Public Health, School of Medicine, Yale University

MARGARET C. KLEM, B.A., Chief, Medical Economics Section, Division of Health and Disability Studies, Bureau of Research and Statistics, Social Security Administration, Federal Security Agency

R. L. McNAMARA, Ph.D., Social Scientist, Bureau of Agricultural Economics, USDA

MILTON I. ROEMER, M.D., Surgeon, Associate in Medical Care Administration, States Relations Division, U. S. Public Health Service, Federal Security Agency

MARK V. ZIEGLER, M.D., Chief Medical Officer, Farmers Home Administration, USDA

The wide-spread interest in improving the organization and administration of health and medical services is well illustrated by the growth of prepayment plans for medical care, such as those in industry and those sponsored by consumer and professional groups, and by active discussion of proposals for a comprehensive national health service. Developments such as these have focused attention on the need, in areas both of governmental and voluntary activity, for greater emphasis on exchange and dissemination of information and experience among those in this field, and for equipping personnel now in or preparing to enter this work with information and techniques essential to effective operation. The courses listed below reflect, along one line, the efforts of the committee listed above to make such provision for personnel in both governmental and voluntary agencies in the Washington area. It is also anticipated that experience and materials developed through this program will be of considerable value to other institutions interested in providing such educational opportunities.

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460. Introduction to Medical Economics

Fall, 2 credits

MARGARET C. KLEM and SPECIALISTS

A review of the economic status of the population; indications of unmet needs for health services; death rates, prevalence and duration of illness, results of physical examinations in selected population groups, receipt of medical care, comparison of care received with estimates of adequacy, expenditures for medical care including a summary of the outlays by government, industry, philanthropy and consumers and the uneven burden of consumer medical costs; distribution of health personnel and facilities and incomes of hospitals and health personnel; utilization of health facilities; various insurance programs for hospital and medical service; summary of public opinion and proposals for improving distribution of medical care. *Prerequisite:* Elementary courses in social science, or equivalent experience as approved by instructor.

City Planning and Urban Development

(See p. 123)

540. Health Service Programs

Spring, 2 credits

MARGARET C. KLEM, ELIN ANDERSON and SPECIALISTS

Major developments in the organization and administration of health and medical services. The work of the Committee on the Cost of Medical Care 1928-32; the National Health Survey 1934-35; etc. The growth of Blue Cross hospitalization plans, medical society and other medical care plans including health and welfare provisions in union contracts. Provisions of the Social Security Program and their implications for future health planning. Selected programs of organized health services: public assistance medical care; care for the armed forces, the veterans, etc.; programs in agriculture; mental hygiene and tuberculosis control; maternal and child health. Recent developments in public health activities, governmental and voluntary. Prepayment methods for meeting medical costs. Hospital planning and construction program. Health personnel, numbers and types needed, training and effective distribution. Critical study and evaluation of a comprehensive national health service. *Prerequisite:* Introduction to Medical Economics or equivalent in education or experience as approved by instructor.

770. Seminar on Health Service Programs

Spring, 2 credits

MARGARET C. KLEM and MILTON I. ROEMER

The principles of health planning; evaluation of present and pending health legislation; administrative problems and techniques; professional participation and community organization for improving health services. The particular interests of the students will determine major emphases of the seminar. *Prerequisite:* Introduction to Medical Economics or equivalent experience as approved by instructor.

Interview Survey Techniques in the Social Sciences

(See p. 46)

Seminar in Rural Social Policies

(See p. 97)

LABOR ECONOMICS

The field of labor economics has been an area of considerable research and thoughtful analysis. All persons in the community are deeply affected by labor problems, yet there is a great need for a more widespread comprehension of the data and experiences well known to labor economists. Government employees in most agencies can also increase their effectiveness through a knowledge of the labor implications of their operations. The following courses are designed to meet such needs—by presenting a body of significant information, the evaluation of scholars, and the techniques of administrators in this vital area of economic relations.

305. Introduction to Labor Problems

Fall, 2 credits

(To be announced)

A survey course presenting salient facts indispensable to an understanding of the major problems of industrial workers: wages, hours, and plant conditions; productivity and technological progress; job security and unemployment; special problems of marginal workers (women, children, migrants, convicts, etc.). Also a review of the approaches to these problems made by employers, unions, and Government.

320. Economics of Labor Standards

Spring, 2 credits

(To be announced)

Consideration of economic aspects of the various terms and conditions of employment: theories of wage determination; effects of minimum wages, incentive wages, and changing wage levels; determination of optimum hours and shift operations, technological advances and labor adjustments; business fluctuations and employment security; and economic consequences of selected union policies. Special emphasis on current national problems. *Prerequisite:* Introduction to Labor Problems or equivalent.

[330.] **Trade Union Movement: Organization** (1948-49 and alternate years)

[425.] **Trade Union Movement: Policies and Procedures** (1948-49 and alternate years)

[455.] **Fundamentals of Social Insurance** (1948-49 and alternate years)

[403.] **Labor and Social Legislation Abroad** (1948-49 and alternate years)

FAITH M. WILLIAMS, assisted by

JEAN A. FLEXNER, JULES HENRY, IRVING KRAVIS and OSCAR WEIGERT

760. Government and Labor Problems

Year, 3 credits each semester (alternate years)

DAVID ZISKIND

First semester: The functioning of law and Government agencies in the field of labor standards. Analysis of statutes and judicial decisions on minimum wages; wage payment and collection; maximum hours; employment of women, children, prisoners, and immigrants; home work; industrial accidents and diseases; vocational training; and employment agencies. Attention will be given to the administrative problems of state and Federal agencies and to the work of the International Labor Organization.

Second semester: The functioning of law and Government agencies in the field of labor relations. Analysis, through case situations, of statutes and judicial decisions on organizations of trade unions, the incidents of union membership, collective bargaining, strikes and lockouts, picketing, boycotts, blacklists, conciliation and arbitration, and trade union responsibility. Attention will be given to administrative procedures of the National Labor Relations Board and the state labor relations boards. *Prerequisite:* Introduction to Labor Problems and general undergraduate work or equivalent.

[456.] **Economics of Collective Bargaining** (1948-49 and alternate years)

594. Settlement of Labor Disputes

Spring, 3 credits (alternate years)

DAVID ZISKIND

An analysis of strikes and lockouts, a study of conciliation and arbitration, and a survey of private industry adjustment schemes. Special attention will be given the work of the United States Conciliation Service, the National War Labor Board, State Boards of Mediation and Arbitration, and the impartial machinery of the garment, printing and maritime industries.

Measurements of Economic Activity

(See p. 91)

Modern Theories of Business Fluctuations

(See p. 91)

The Planning of Statistical Surveys (See p. 45)

Work Measurement and Performance Standards (See p. 73)

DIVISION OF INTERNATIONAL RELATIONS

COMMITTEE ON INTERNATIONAL POLICIES AND PROBLEMS

H. DUNCAN HALL (Chairman)

HAROLD LASSWELL, Ph.D., Consultant, Office of Assistant Secretary Benton, Department of State; Yale Law School

WALTER H. C. LAVES, Ph.D., Deputy Director General, UNESCO

EGON RANSHOFEN-WERTHEIMER, Overseas Offices Division, United Nations

LEWIS H. ROHRBAUGH, Ph.D., Director, Graduate School, USDA

GEORGE L. RIDGEWAY, B.Litt., Director of Economic Research, International Business Machines Corporation, New York

LESLIE A. WHEELER, M.B.A., Director, Office of Foreign Agricultural Relations, USDA

CLAYTON E. WHIPPLE, M.S., Acting Chief, Regional Investigations Branch, Office of Foreign Agricultural Relations, USDA

FRANCIS O. WILCOX, Ph.D., Head International Relations Analyst, Library of Congress

The point has been reached in history where there is no longer any citadel, and where most aspects of government and life are parts of a wider international complex. No nations, not even the greatest water-isolated or land-locked states, are free from the possibility of physical attack in strength on their vital nerve centers and the masses of their population. Nor can any nation relax its constant vigilance to maintain the inner cohesion of its society against the disintegrating effects of psychological and political aggression through all modern channels of communication, including the infiltration of agents of foreign ideologies and political systems. On the other hand, most of the major activities of modern life, such as production, trade and finance, communications, science and culture, have no independent national existence but are parts of a world wide system of relationships. Lack on the part of any people of a widespread and intelligent understanding of the international backgrounds and ramifications of the activities of almost every branch of the national government and economy is lack of a competence necessary not only to efficient work but also to survival in a competitive and unstable world.

These courses have been designed to give both the general international background, psychological, political and administrative, and the more specialized backgrounds in such fields as international trade, finance and agriculture.

The courses on the basic aspects of international political psychology and world politics are placed first. Because in human nature, and in society which has created the state system (itself the sole means of avoiding universal anarchy and with it international war), the basic problems are psychological and political; the elements, both rational and irrational, social and asocial. More specialized courses are provided on world organization and administra-

tion, national defense, American foreign policies, the relations of the great powers and the special problem of the frontier zones between the powers occupied by non-self-governing peoples. On the economic side, courses are provided in international, financial and trade policies, and aspects of world agriculture, agricultural policies and world communications and transport.

427. Psychology of International Politics

Fall, 3 credits

H. M. SPITZER

Review of psychological and psycho-analytic theories of human behavior. Psychological mechanisms. Types of character structure. The concept of national character. Propaganda. National types of diplomacy. National patterns of thought. Psychological relations between national groups.

525. Seminar on the Application of Psycho-Social and Psychoanalytic Methods to Problems of International Relations

Spring, 2 credits (alternate years)

H. M. SPITZER

The topics to be treated are to be agreed upon between lecturer and students, each of whom will be expected to prepare two papers for discussion by the class. *Prerequisite*: Psychology of International Politics, a major in psychology or history or equivalent experience approved by instructor.

820. Seminar in American Foreign Relations, Policies and Practices

Spring, 3 credits (alternate years)

NELSON TRUSLER JOHNSON

Fundamental principles as developed in the conduct of our foreign relations from the Declaration of Independence up to the close of the free immigration period in 1925; significant subsequent developments through and following World War II, requiring us to accept and meet the responsibilities which go with our position among the nations.

United States Government organization for conducting its business with other governments. Factors which have played major roles in the development of foreign policy: commerce, international finance, shipping, fishing, agriculture, etc.; public opinion and the influence of media of mass communication; minority and pressure groups; etc. Implementation of foreign policy in peace and war, choice of people and machinery; informing other peoples about ourselves and how best to accomplish it. Need for effective coordination of our governmental machinery so as to identify and harmonize the needs and convictions of the whole American people in a united common action for the achievement of their ideals. Present methods of coordination. Other possible methods, including the Secretariat system. *Prerequisite*: Graduate study in the social sciences, or responsible administrative or supervisory experience, or approval of instructor.

428. Current Problems of World Politics

Summer, 3 credits

H. M. SPITZER

Structure of state system; nationality; sovereignty as the maximum area of agreement. "We the peoples of the United Nations." Conditions of peace and causes of war (conflicts of will, interests and ideas; desires for things incompatible with peace; political, economic and ideological aggressions; insecurity, etc.). State and private struggle for power on the economic plane. Raw materials, population, agriculture and food. Diplomacy; military organization; ideological manipulations (political and psychological warfare by use of channels of communications, such as speech, press, radio, etc.); attempts to maintain peace

and reasons for failure. Facilitating international cooperation, political, economic, cultural; and mitigating conflict by means of international institutions, public and private.

[429.] **World Social Structure** (1948-49 and alternate years)

[724.] **Problems and Machinery of World Organization** (1948-49 and alternate years)

725. Seminar in the Practice and Technique of International Administration

Fall, 2 credits (alternate years)

HOWARD B. CALDERWOOD

Designed to meet the needs of government officials likely to be concerned directly or indirectly with international bodies and conferences or the operation of international agreements. Special emphasis will be laid on the organization, procedures and working of International Conferences, Organs of the UN and of specialized agencies brought into relationship with the UN. *Prerequisite:* An undergraduate degree in one of the social sciences, or responsible administrative or supervisory experience, or approval of instructor.

[726.] **Legal Aspects of International Relations** (1948-49 and alternate years)

[727.] **Seminar in Problems of National Defense and of the Prevention of War** (1948-49 and alternate years)

STEFAN T. POSSONY

International Financial and Trade Policies (See p. 91)

Seminar in International Financial and Trade Policies (See p. 91)

Economic Theory of International Trade (See p. 91)

814. World Agriculture

Fall, 4 credits R. G. HAINSWORTH, CLARENCE M. PURVES, CLAYTON E. WHIPPLE

A survey of world agriculture including: (1) world agricultural geography, studying the influence of climate, soil and topography, density and distribution of population with the aid of illustrative material; (2) problems of collection and analysis of statistics on world production, trade and consumption of principal crop and livestock enterprises; (3) an analysis of how countries of strategic importance including France, Germany, Italy, and the Soviet Union, China, India, Japan, Australia, Argentina, Brazil and Canada have adapted their agriculture to climatic and economic conditions. *Prerequisite:* Background work in agricultural economics or equivalent.

815. Seminar in National and International Policies Affecting Agriculture

Spring, 2 credits

LESLIE A. WHEELER

Comparison of national agricultural policies including U.S.A., British Commonwealth, U.S.S.R., etc.; objectives, mechanisms, results and survey of current efforts directed toward international collaboration in the agricultural field, including FAO and ITO, international commodity agreements, technical cooperation on bilateral or limited multilateral basis. Will consist of roundtable discussions under direction of leader assisted from time to time by outstanding

authorities from U.S.A. and abroad, such as Sir John Boyd Orr, Director-General of the FAO; A. N. Duckham, Counsellor, British Embassy; Eugene Demont, Vice-Chairman, Central Committee, IEFC; and L. A. H. Peters, Agricultural Counsellor, Netherlands Embassy. *Prerequisite:* Responsible administrative experience in agriculture or a related field; or a college degree or equivalent; or consent of instructor.

065. Food and Agriculture Organization of the United Nations; Background and Programme

Fall, non-credit

GOVE HAMBIDGE, C. E. ROGERS and LECTURERS

A lecture and discussion series, led by appropriate FAO senior executives, on the international problems faced by FAO, their background and nature, and plans for meeting them. Given from the standpoint of the politically conscious citizen as well as that of the agricultural producer.

Role of products of the land and sea in international trade; technical problems in the field of four of FAO's divisions (Nutrition, Agriculture, Fisheries and Forestry), the particular character these problems assume in different geographical regions, and ways in which these divisions are expected to advance solution of these problems; the work of the Economics, Marketing, and Statistics Division which links these technical activities and the general economic framework within which FAO operates. The FAO administrative set up; changes in the original conception of FAO as envisaged prior to its creation; and relationships with other UN organizations and international agencies.

[816.] World Communications and Transport (1948-49 and alternate years)

WILLIAM VAN ROYEN and SPECIAL LECTURERS

817. The Policies and Inter-Relations of the Great Powers—U.S.A., British Commonwealth and U.S.S.R.

Spring, 2 credits (alternate years)

H. DUNCAN HALL and OTHERS

The Role of the Great Powers in World Politics: political, economic and psychological factors. Changes in relative positions of Great Powers in the 19th and 20th century. Their role before and during the war. Their relations with the smaller powers. The UN Charter and the part played in the UN, and outside, by the Great Powers. The USA: world interests; domestic and foreign policies; defense. The British Commonwealth of Nations: structure and internal relations; foreign policies; relations with USA and USSR; how the Commonwealth has worked in practice; diversity of economic interests and trade policies. The USSR: the traditional background; expansion of Imperial Russia; political and economic structure of USSR; foreign policies in border lands and in relation to other Great Powers, UN, etc. *Prerequisite:* An undergraduate degree in one of the social sciences, or responsible administrative or supervisory experience, or approval of instructor.

[819.] Non-Self-Governing Peoples and Trusteeship, National and International (1948-49 and alternate years)

BENJAMIN GERIG and JAMES F. GREEN

430. Modern Russia

Fall, 3 credits. Repeated in Spring

VALERY J. TERESHTENKO

Beginning with a brief summary of political, social and cultural life in Imperial Russia, the major emphasis will be on Russia since the Revolution: the Revolution of 1905; the wars with Japan and Germany; the Revolution of 1917; Lenin and Trotsky; the NEP and Five-Year Plans; the Russia of Stalin; its role in World War II. Survey will include an analysis of factors determining the position of Russia in world affairs: geography, population, the Russian heritage,

revolutionary development, political and economic development, institutions and external interests.

[431.] Modern China (1948-49 and alternate years)

432. Modern Japan

Fall, 2 credits (alternate years)

JOSEPH G. YOSHIOKA

Designed to develop an understanding in proper perspective of the Japanese character and morale, an understanding essential to any plan of rehabilitation and reorientation of the Japanese under occupation. Begins with a brief introduction to Japanese geography and anthropology, and political history of legendary, theocratic, bureaucratic, feudal and centralized feudal Japan, and follows with analysis of factors responsible for the rise and fall of modern Japan. Discussion of the family system, social institutions, religion (Shintoism, Buddhism and new religions), education, literature, art, science, economy of daily life, individual and group psychology, cultural patterns, militarism, imperialism, and labor and communist movements.

440. Problems of the Balkans and Middle East

Spring, 3 credits (alternate years) CLAYTON E. WHIPPLE and AEF I. TANNOUS

The political and socio-economic problems of the region and its component nations; review and analysis of the problems and their background, and of solutions put forward. Special emphasis on rural and agricultural problems, including the current United States programs in Greece and Turkey.

Lectures and discussions on special problems will be presented by outstanding authorities on the region including ambassadors, ministers and world-famed scholars such as: Dr. M. Akrawi, Director General of Education for Iraq; Dr. Charles Malik, Minister of Lebanon; Dr. Irwin T. Sanders, University of Kentucky; Dr. Costi Zurayk, Minister of Syria; and others. A complete list of visiting lecturers and topics will be issued in January 1948.

[435.] Latin America (1948-49 and alternate years)

DIVISION OF COMMUNICATIONS AND TRANSPORTATION

COMMUNICATIONS

The communications industry has an economic, political and psychological significance far greater than its size in terms of dollar investment or employment would indicate. The definition of the field depends upon the purpose of the student. For the purposes of this curriculum the broadcast scope covered includes person-to-person communication by wire, radio and mail, and radio mass communications; the press is not included as such, although it is involved in part. Person-to-person communication service in the United States is provided by the telephone industry (with property valued in excess of \$7 billion and more than 600,000 employees), the domestic telegraph industry (with book assets of about \$200 million and 60,000 employees), the international radio-telegraph and cable industry (with book assets of about \$75 million and 3,500 employees), and the United States Post Office. Radio mass com-

munications are provided by about 1,300 domestic standard broadcast stations (with some 30,000 employees), about 200 frequency modulation (FM) broadcast stations and 25 television stations. The radio industry as a whole has book assets of somewhat under \$100 million.

The Federal Communications Commission is the Federal agency primarily concerned with wire and radio communications, since it is responsible for regulating the rates and service of common carrier operations, and with the licensing and regulation of radio stations. Other Government agencies such as the U. S. Office of Education, the Department of Agriculture, the Civil Aeronautics Administration, the Commerce Department and the Federal Trade Commission have direct interests either in the educational or regulatory aspects of radio. Lastly, the Post Office Department is responsible for the United States mails. Employees of these agencies and other persons, whether or not employed by the Federal Government, will find that the courses listed below and related courses will help to develop an educational background for work in this field.

338. Regulation of Communication

Fall, 2 credits (alternate years)

WALTER B. EMERY

General factors (technical, social, political, economic, etc.) which brought about need for Government regulation of radio and other forms of communication; review of provisions of Congressional Acts of 1910, 1912, 1927 and 1937 and proceedings and accomplishments of national and international conference as well as Congressional hearings; functions and organizational structure of FCC, its relation to other Federal agencies, to Congress and the general public; factors and procedures involved in application for radio station; qualifications of applicants, standards imposed by law and by FCC rules and regulations as to operation of various types of stations (standard, FM, television, facsimile, experimental, etc.); general requirements to be met by all licensees in light of "public interest, convenience and necessity"; programming problems in terms of public needs; modification, renewal and revocation of licenses; special rules for network-affiliated stations; significant FCC and Court decisions on radio; review of recent developments in radio and analysis of problems of social control. Course primarily for those interested in studying regulations of communications, those actively engaged in operations, such as station managers and program directors, and professional persons wishing to learn more of rules and regulations relative to radio.

[605.] **Communications in Society** (1948-49 and alternate years)

DALLAS W. SMYTHE

Transmission and Distribution Systems for Area Electrification (See p. 117)

The Planning of Statistical Surveys (See p. 45)

TRANSPORTATION

COMMITTEE ON TRANSPORTATION

HAMPTON K. SNELL, Ph.D., Head, Division of Transportation, College of Business Administration, University of Texas (Chairman)

RUSSELL B. ADAMS, Director, Economic Bureau, Civil Aeronautics Board
 FORD EDWARD, Ph.D., Head Cost Analyst, Interstate Commerce Commission
 SIDNEY L. MILLER, Ph.D., Professor of Transportation, University of Pittsburgh

FREDERICK L. THOMSEN, Ph.D., Head, Division of Market Research, Industrial Commodity Corporation, New York City
 J. C. WINTER, Chief, Transportation Facilities Division, Marketing Facilities Branch, Production and Marketing Administration, USDA

The transportation industries and facilities constitute an extremely important part of the economic organization of the United States, involving an investment of probably more than 60 billion dollars and requiring more than two million employees. The railroads account for more than 60 per cent of the employees and somewhat less than one-half of the investment; public highways alone account for more than half of the total investment. About 15 per cent of employees work in water transport and another 15 per cent in intercity trucks and buses. City transport and the rapidly growing airlines account for the remainder.

The majority of "white-collar" workers are in traffic departments of carriers: as solicitors, clerks and rate specialists; as accountants; and in various engineering and law positions. In the Federal service most transportation work is in such agencies as: Interstate Commerce Commission, Civil Aeronautics Administration, Civil Aeronautics Board, Maritime Commission, Department of Commerce, Bureau of Federal Supply, General Accounting Office, Public Roads Administration, Department of Agriculture, War Department and Navy Department; and in the specialized divisions of Justice, Interior, War Assets, and other agencies. For such employees and to others wishing to enter the field of transportation, whether in governmental or non-governmental organizations, the courses listed below, and related courses, will help to build a practical background of education and training.

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337. Principles of Transportation

Fall, 3 credits

JAMES C. NELSON

Characteristics and economic principles of railway, highway, waterway, and air transportation. Transportation geography and principal commodity movements of the United States. Freight and passenger rate principles. Varieties of competition, cooperation, consolidation, coordination. Transportation, labor relations and financial problems. Interstate Commerce Act; principles of interstate and intra-state regulation of railway, highway, waterway, and air transportation. Sources and interpretation of transportation data and information particularly for Government employees.

601. Traffic Management

Fall, 3 credits

JAMES F. PERRIN

Designed to acquaint transportation students with the principles and practices of traffic management from both Governmental and commercial points of view. Emphasis on functions of a traffic department, both industrial and Governmental, and on relations between carriers and traffic departments, with a considerable portion of the emphasis placed on transportation law. *Prerequisite*: Experience with rates and structures.

602. Traffic Management—Rates and Rate Determination

Spring, 3 credits

ABBEFORD S. DOLCH

Use of traffic documents; commodity classification; rate principles and determinations; tariffs and traffic publications for the several forms of transportation. Review and analysis of traffic files and materials. *Prerequisite*: Traffic Management or experience with rates and structures.

651. Commercial Air Transportation

Fall, 3 credits

MYLES E. ROBINSON

A practical course in the organization, services, charges and regulations of domestic and international air transportation. It includes the study of the development of aviation and air transportation, air mail, express, cargo and passenger traffic and charges; also the aid and development of commercial air transportation and Government regulation of air carriers. *Prerequisite*: Principles of Economics, or equivalent as approved by instructor.

690. Air Traffic Management

Summer, 2 credits

MYLES E. ROBINSON

A course in the principles and practices of air transport carriers in the domestic and foreign service, designed for those interested in the development of air transportation and the traffic aspects of commercial air-line work. The scope of the course includes the study of developments of air transportation, including airports and airways; airmail services and rates; air express and freight transportation and rates; air passenger transportation services and fares; the publication of air express and passenger tariffs and other aspects of traffic management as applied to air transportation. The course concludes with the consideration of local, state, Federal and international regulation and development of air transportation.

[603.] **Highway and City Transportation** (1948-49 and every third year)

[604.] **Water Transportation** (1949-50 and every third year)

City Planning and Urban Development (See p. 123)

DIVISION OF PSYCHOLOGY

The program of this division is for the most part composed of courses designed expressly to fit into curricula meeting the needs of a particular field or profession and is not intended to represent a progressive sequence in courses in psychology. For example, several courses are intended primarily for those concerned with some phase of personnel administration; two others constitute integral

parts of the program in international relations. It remains, however, that the general or specialized study of the bases and methods of human motivation have implications and applications broader than any one field or profession.

400. Psychology of Human Relations

Fall, 2 credits. Repeated in Spring and Summer

CHARLES P. SPARKS

A course in practical psychology to give students an understanding of psychology of everyday life. It includes a study of basic principles of human behavior; why people behave as they do. It is designed to help the student understand other people better. This is not the usual course in introductory psychology but is designed for students who want a general basis in practical psychology.

Psychology of International Politics

(See p. 103)

500. Child and Adolescent Psychology

Spring, 2 credits

(To be announced)

A course designed for those who want to understand the growth and development of children. It covers the period from infancy through adolescence and studies the physical, mental, and emotional development of the child. The course includes discussion of the process of physical and mental growth and resulting physical, social and emotional changes with particular reference to the period of puberty.

501. Social Psychology

Fall, 2 credits

WALTER C. MCKAIN and CARL C. TAYLOR

A general and introductory course on the social aspects of personality, social interaction and collective behavior. It includes treatments of cultural conditioning of personality, personality measurement, communication, public opinion, propaganda, censorship, mobs, riots, and social movements. *Prerequisite:* A course in general psychology or equivalent.

502. Rural Social Psychology

Spring, 2 credits

CARL C. TAYLOR and WALTER C. MCKAIN

A specialized course on the social psychology of rural people. Particular attention will be given to such topics as rural isolation, the reign of tradition and custom, farmers' public opinion, and farmers' movements. *Prerequisite:* A course in general psychology or equivalent.

Tests and Measurements

(See p. 76)

503. The Conditions of Personality Growth

Spring, 2 credits

JANE ALBEN SHEPHERD

This course treats the principal factors influencing personality development: physiological bases, infantile and childhood experiences, and cultural determinants. It considers both experimental and clinical contributions to the theory of personality and the application of those to practical problems of interpreting and dealing with people. *Prerequisite:* A course in general psychology or equivalent.

504. Personality Disorders

Fall, 2 credits

ALBERT C. CORNSWEET

This course through lectures and case discussion will deal with personality variations as seen among normal people, stressing the significance of such variation in social and occupational adjustment, and with major types of abnormal personalities with emphasis on recognition of these deviations. Designed to help meet the needs of placement officers, counselors and others who through interviews or other media must recognize and deal with problems of emotional maladjustment. *Prerequisite:* A course in general psychology or equivalent.

505. Principles of Interviewing

Fall, 2 credits

HELEN SLOMAN PRYOR and LELAND P. BRADFORD, Consultant

The different purposes for which interviews are used and the principles and techniques appropriate to interviews of various types. Special emphasis is placed on interviews which are concerned with attitudes and feelings and on the use of client-centered or non-directive techniques in promoting improved employee adjustment. As a basis for the interviewer's better understanding of both himself and the interviewee, there is a practical review of the more important psychological principles involved in the interview situation. Designed particularly to help meet the needs of placement and employee relations officers, supervisors, and counselors. *Prerequisite:* A course in general psychology or consent of the instructor.

Public Personnel Administration

(See p. 75)

565. Interview Workshop

Spring, 2 credits

HELEN SLOMAN PRYOR and LELAND P. BRADFORD, Consultant

An intensive study and practice in interviewing, with emphasis on that kind of interview which is primarily concerned with the feelings, emotions, and attitudes of employees. Attention is directed toward seeing what actually happens in the interview and why interviewer and interviewee behave as they do. Various techniques are studied particularly from the standpoint of their effectiveness in accomplishing the purposes of the interview. Verbatim reports and practice interviews are used extensively to improve interview skills. Students are expected to contribute interview material and problems from their own experience. *Prerequisite:* Principles of Interviewing or equivalent plus interviewing experience, or consent of instructor. Limited to 20 students.

Interview Survey Techniques in the Social Sciences

(See p. 46)

520. Introduction to Sociometry and Psychodrama

Spring, 2 credits

MARGARET E. BARRON

Basic principles and techniques of psychodrama, an action method of work with people which has many different applications: therapy, research, and testing. Major emphasis in this course is on application as a training technique. "Role-playing" or "reality practice" gives a means of translating principles into methods, permits application of what is under study to situations where trainees are not "playing keeps." The use of action techniques as part of a training plan and their relation to basic learning principles is discussed, with application of the method to specific training problems, including supervisory, interview, and secretarial training. Members of the group will have opportunity to lead practice training sessions. Sociometry, the study and measure of psychological networks within groups, is covered briefly: as a background for some of the principles of psychodrama and for understanding of group structure and its relation to group

effectiveness and morale. Applications of sociometric techniques in both research and remedial work in community, institutional, and employment situations are discussed. *Prerequisite:* Bachelor's degree plus experience at grade CAF-7 or above in training, supervision, personnel administration; or consent of instructor. Limited to 15 students. (Some sessions will be held at the psychodramatic theater at St. Elizabeth's Hospital.)

[739.] Psychological Foundations of Economics (1948-49 and alternate years)

Seminar on the Application of Psycho-Social and Psycho-analytic Methods to Problems of International Relations
(See p. 103)

DIVISION OF SOCIOLOGY

COMMITTEE ON SOCIOLOGY

CARL C. TAYLOR, Ph.D., Chief, Division of Farm Population and Rural Welfare, Bureau of Agricultural Economics, USDA (Chairman)

HAROLD DORN, Ph.D., Statistical Coordinator, Division of Public Health Methods, United States Public Health Service, National Institute of Health

JOHN PROVINCE

SAMUEL STAUFFER, Ph.D., Professor of Sociology, University of Chicago

CONRAD TAEUBER, Ph.D., Economist, Food and Agriculture Organization of the United Nations

CAROLINE WARE, Ph.D., Professor of Sociology, Howard University

OSCAR WEIGERT, Jur.D., Labor Economist, Staff on Foreign Labor Conditions, Bureau of Labor Statistics, Department of Labor

Sociology consists of a description and analysis of group life or of the structure and functioning of social groups. There are thousands of different kinds of social groups and every person lives in a number of different groups. Because of these facts all persons have extensive group experience. Few persons are, however, capable of analyzing the structure and functioning of groups, the interaction between individuals and groups, and the interactions between groups. It is out of these interactions that social problems arise and social planning is done, and out of them that personality maladjustments arise and personal development is accomplished. All sociology courses deal with either generalized or specialized descriptions and analyses of these interactions and the problems that arise out of them. The courses offered by this division are those which, it is felt, concern most directly the needs and interests of those served by the Graduate School.

215. General Sociology

Fall, 3 credits

ARTHUR F. RAPER

A basic and general study of social problems and processes with special emphasis upon such problems as population, race, poverty, crime, divorce, etc., and with special emphasis upon group processes such as organization, leadership, public opinion, etc.

City Planning and Urban Development

(See p. 123)

- [506.] **Principles of Rural-Urban Sociology** (1948-49 and alternate years)

NELS ANDERSON

- [507.] **Farm Labor and Tenure Problems** (1948-49 and every third year)

LOUIS J. DUOFF and JOHN F. TIMMONS

- [508.] **Agricultural Employment and Wages** (1948-49 and every third year)

LOUIS J. DUOFF

509. La America Latina y los Estados Unidos

Year, 2 credits each semester

PHILIP L. GREEN

Lectures and discussions in Spanish. This course provides an opportunity to achieve greater facility in Spanish, while acquiring useful and interesting information on the life of the Latin-American countries and their relations with the United States. The first semester analyzes racial, geographic, economic, and political forces that have shaped Latin-American development; and surveys important contributions of Latin-American literature, art, music, social legislation and other spheres of human activity. The second semester embraces fundamental trends and influences for and against inter-American friendship, from earliest times to the present day. It describes official and non-governmental inter-American relations, presents problems and indicates opportunities facing the Americas today. *Prerequisite:* Registration is limited to students who have had the requisite instruction and practice in Spanish. Those who are in doubt as to their adequacy in this regard are advised to confer with the instructor before registering.

- [510.] **Population** (1949-50 and every third year)

CONRAD TAEUBER assisted by IRENE B. TAEUBER

- [511.] **Population Research Methods and Analysis** (1949-50 and every third year)

MARGARET HAGOOD

- [512.] **Culture of Contemporary American Rural Life**

CARL C. TAYLOR

- [513.] **Contemporary National Cultures**

CARL C. TAYLOR

514. The Social Problems of Administration

Spring, 3 credits (alternate years)

JOHN PROVINSE

Deals with the social, cultural and psychological processes and groups which operate within administration, especially the administration of industries and government. It deals with the influence of previous social status and social conditioning upon persons operating within administration, and with sub-non-structural groups which operate within all administrative groups. It is not a course in administration or administrative efficiency, but a course in the sociology of administration. *Prerequisite:* Responsible administrative experience.

- [515.] **Rural Organization and Group Action** (1948-49 and alternate years)

DOUGLAS ENSMINGER

- [740.] **Seminar in Rural Organization** (1948-49 and alternate years)

DOUGLAS ENSMINGER

Seminar in Rural Social Policies

(See p. 97)

516. The Cultural Regions of the United States

Fall, 3 credits (alternate years)

CARL C. TAYLOR and ARTHUR F. RAPER

This course is a study of the cultural regions of the United States covering in detail the characteristics of the various regions and subregions and their interrelationships, including settlement patterns, social organizations and institutions, prevailing ideologies, modes and folkways, and dominant attitudes and opinions of the people who live in the rural areas of these cultural regions. *Prerequisite:* Two courses in social science.

Department of Technology

DEPARTMENTAL COMMITTEE

F. J. SETTE, M.S., Special Assistant to the Director, Bureau of Reconversion Priorities, Civilian Production Administration (Chairman)

THOMAS B. CHAMBERS, C.E., Chief, Engineering Division, Soil Conservation Service, USDA (Vice-chairman)

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WILLIS S. MACLEOD, I.M.E., Deputy Director, Bureau of Federal Supply, Treasury Department

WILLIAM R. OSGOOD, Ph.D., Mechanical Engineer, Structural Mechanics Division, David Taylor Model Basin, Navy Department

ROBERT W. TRULLINGER, C.E., Assistant Administrator and Chief, Office of Experiment Stations, Agricultural Research Administration, USDA

GILBERT S. UNDERWOOD, M.A., Supervising Architect, Public Buildings Administration, Federal Security Agency

FAYETTE S. WARNER, Ph.D., Engineer-Economist, Federal Power Commission

MARSHALL S. WRIGHT, Technical Assistant to the Chief, Office of Plant and Operations, USDA

ENGINEERING SOCIETIES COMMITTEE

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HENRY W. AUSTIN, M.E., American Association of Engineers

FREDERICK M. FEIKER, E.E., Washington Society of Engineers

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A. L. SHALOWITZ, LL.M., American Congress on Surveying and Mapping

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JOHN C. GREEN, LL.B., Director, Office of Technical Services, Department of Commerce

JOHN E. HANSBURY, B.S., Assistant Head Valuation Engineer, Bureau of Valuation, Interstate Commerce Commission

FRED E. LEVI, M.S., Executive Assistant, Administrative Management Division, Bureau of the Budget

CARTER MCFARLAND, Ph.D., Assistant to the Director of Personnel, Office of the Administrator, National Housing Agency

WILLIS MACLEOD

ARTHUR P. MILLER, C.E., Sanitary Engineer Director, U. S. Public Health Service, Federal Security Agency

W. N. REHLAENDER, Director of Personnel, Federal Works Agency

W. E. SPOFFORD, Technical Consultant, U. S. Maritime Commission

E. J. STOCKING, M.S., Assistant Chief, Examining and Placement Division, Civil Service Commission

ARTHUR W. TURNER, B.S., Assistant Chief in Charge of Agricultural Engineering Research, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, USDA

E. J. UTZ, B.S., Chief, Land Use and Settlement, Branch of Operation and Maintenance, Bureau of Reclamation, Department of Interior

COMMITTEE ON AGRICULTURAL ENGINEERING

ARTHUR W. TURNER (Chairman)

THOMAS B. CHAMBERS (Alternate)

CARL A. JOHNSON, B.S., Chief, Engineering Section, Farm Ownership Division, Farmers Home Administration, USDA

COVINGTON G. KILBOURNE, E.E., Head, Steam Plants Unit, Engineering Division, Rural Electrification Administration, USDA

WILLIAM K. KNAUFF, Chief, Equipment and Engineering Services Division, Office of Plant and Operations, USDA

CHARLES A. LOGAN, M.S., Superintendent, Office of Operations, Agricultural Research Center, Agricultural Research Administration, USDA

SAMUEL P. LYLE, M.S., In Charge, Agricultural Section, Extension Service, USDA

ROSS E. MOORE, Ph.D., Chief, Technical Collaboration Branch, Office of Foreign Agricultural Relations, USDA

T. W. NORCROSS, M.S., Chief, Division of Engineering, Forest Service, USDA

—O—

For more than ten years, the various departments and agencies of the Federal Government have been engaged in extensive pro-

grams of conserving natural resources and raising the standards of living and welfare in urban and rural areas. These programs have been translated into specific projects involving flood control, soil conservation, power development, rural electrification, industrial hygiene, housing and a number of related activities. Preparation for defense and later production for war involved expansion of the existing industrial plant and, when access to raw materials was prohibited by enemy action, the development of new facilities for the manufacture of substitute materials. All these governmental actions have involved in varying degrees engineering techniques and engineering personnel.

Basically, education in engineering schools, limited by necessity and tradition to a period of four years, is mainly technical. In this short period, barely sufficient to assimilate and master a minimum of the basic sciences, there is little room for courses to supply the engineering student with background in the social and economic world about him so that he may understand the impact of the advances of his profession upon society. Moreover, developments in the sciences and in engineering require enlarging of the engineer's technical background.

Mindful of these limitations of engineering education and of the engineer's place in modern society, the Graduate School, working together with representatives of the various Government departments and of the local chapters of engineering societies, proposes to offer recommended courses intended to add to the technical, administrative and professional background of engineers in the service of the Federal government.

The Department of Technology offers a number of courses in those skills basic to engineering operations which will be of assistance to the engineer, the applied scientist and the non-engineer desiring to broaden his background.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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DIVISION OF ENGINEERING

THOMAS B. CHAMBERS (Chairman)

402. Principles and Practice of Refrigeration

Spring, 2 credits

HARRY L. GARVER

Includes a study of: types of mechanical equipment, power, controls, evaporators, condensers, insulation and heat transfer, characteristics of refrigerants

and eutectic solutions; refrigeration requirements for different foods; management of storages; and refrigerated transportation. *Prerequisite:* Physics, algebra, trigonometry, and analytic geometry.

403. Principles of Air Conditioning

Fall, 2 credits

RICHARD S. DILL

Different methods and processes of air conditioning as applied to homes, offices, warehouses, factories, etc. A discussion of underlying principles based on thermodynamics and mechanical engineering procedures and study of air conditioning installations. *Prerequisite:* Thermodynamics, or completion of junior year in Mechanical Engineering, or Principles and Practice of Refrigeration or equivalent.

501. Transmission and Distribution Systems for Area Electrification

Fall, 3 credits

EDWARD P. EARDLEY

Study of electrical and mechanical characteristics of lines used in the transmission and distribution of power; the operation of such systems; the economic principles on which design rests. *Prerequisite:* Degree in engineering or equivalent experience.

Safety Engineering I: Technical Functions (See p. 77)

Land Economics (See p. 94)

[700.] **Analysis of Rigid Frames** (1948-49 and alternate years)

A. AMIRIKIAN

702. Electric Utility Engineering

Year, 2 credits each semester

J. J. A. JESSEL

Fundamentals of electric utility engineering and their practical application to generating, transmitting, and distributing electric energy by electric utilities. Designed for engineers, engineering aids, lawyers, accountants and others who desire a broader understanding of the basic principles of electric utility engineering as applied to operating electric utilities. Subjects covered are: a general description of production, transmission, and distribution plants of electric utility, including each of the units of the property and an explanation of its functions; lectures and case studies in design and operation of electric generating stations, transmission lines and substations, and distribution substations, feeders, transformers, and services; discussions of practices followed by electric utilities in serving different classes of customers. *Prerequisite:* College degree or equivalent experience.

[703.] **Water Power Engineering** (1948-49 and alternate years)

KENNETH W. ROSS

[704.] **Fundamentals of Gas Turbines and Jet Propulsion**

DIVISION OF APPLIED MECHANICS

WILLIAM R. OSGOOD (Chairman)

706. Advanced Hydraulics

Fall, 3 credits

MARTIN A. MASON

Emphasis on the fundamental physical features underlying hydraulic phenomena encountered in engineering practice. Dimensional analysis and dy-

dynamic similarity, dimensionless numbers, Reynolds and Froude numbers. Velocity fields, principles of energy, continuity and momentum. Equations of viscous flow, laminar motion, fluid turbulence. Boundary layers. Flow in closed conduits and open channels. Resistance of immersed bodies. Wave phenomena, gravity waves in open channels. Text: Rouse, *Fluid Mechanics for Hydraulic Engineers*. *Prerequisite*: Hydraulics and advanced calculus, or the permission of the instructor.

535. Hydraulics of Open Channels

Spring, 3 credits

CHARLES E. JACOB

Non-uniform flow in open channels. Specific-energy curve. Critical depth. States of flow. Types and properties of surface curves. Integration of varied-flow equation by stepwise approximation and by methods of Bakhmeteff and others. Application to design of canals. Hydraulics of natural channels. Stream gaging. Relations between slope, stage and discharge. Slope-area method. The energy and momentum principles in open-channel flow. The hydraulic jump. Surges and translational waves. Text: Bakhmeteff, *Hydraulics of Open Channels*. *Prerequisite*: Hydraulics.

536. Ground-water Hydraulics

Fall, 3 credits

CHARLES E. JACOB

The theory of ground-water flow. Hydraulics of wells, collectors, and galleries. Problems of underground water supply. Artificial recharging and induced infiltration. Salt-water encroachment. Ground-water runoff and stream flow. Drainage and dewatering. Seepage through and under dams. Canal losses and other irrigation problems. *Prerequisite*: Hydraulics or equivalent preparation in physics.

[310.] Aerodynamics (1948-49 and alternate years)

MAURICE E. LONG

Soil Conservation

(See p. 62)

301. Soil Mechanics

Year, 3 credits each semester

EDWARD S. BARBER

Theory and practical applications of soil mechanics to the engineering problems of foundations, dams and embankments. Course designed to familiarize general engineers with problems connected with soils and methods of foundation investigation and laboratory tests available for solving these problems. Foundation investigation methods described include: core drilling, auger boring, test pit digging, record keeping and collection and protection of samples. Laboratory tests to be described include: general classification, permeability, consolidation, compaction, shear and triaxial compression. Laboratory facilities are available for demonstration. *Prerequisite*: College Physics.

Principles of Physical Metallurgy

(See p. 63)

[542.] Mechanical Vibrations (1948-49 and alternate years)

SAMUEL LEVY

DIVISION OF ENGINEERING ADMINISTRATION

WILLIS S. MACLEOD (Chairman)

715. The Engineers' Responsibility in the Administration of Contracts.

Year, 2 credits each semester

F. HAMILTON SEELEY

Study of construction, engineering, developmental and service contracts from the viewpoint of those provisions which involve the responsibility of the engineer

for their administration to assure that engineering provisions of the contract are met. Consideration is given to bidding practices in requirements for inspection and supervision of contracts in the course of construction or fulfillment of the engineering work; considerations of labor provisions and laws, force account operations, supervision and control systems, cost reports and analyses, adequacy of the basis for certification of completion for potential and final payments, hold-back or retention for final satisfactory fulfillment of contract and the presentation, analysis and control of projects under contract as related to the responsibility of the engineer.

The course is designed to assist the engineer in better performing his administrative responsibilities in contract work, particularly as related to Federal employees. *Prerequisite:* Engineering degree, or equivalent, or consent of the instructor.

550. Contracts and Specifications

Fall, 3 credits

WILEY C. SMITH and SPECIALISTS

Development and preparation of contracts and commodity specifications. Basic principles involved in the development and preparation of engineering provisions of contracts with particular emphasis on design, materials, construction, performance; features which contracts must contain in order that engineering requirements of the construction or engineering service can be performed to the satisfaction of the owner, in terms administerable by the engineer; the development and the preparation of the materials standard specification to serve the purposes of obtaining the most economical and serviceable materials, such specifications being developed both from the purchase and use of the material viewpoint; the inter-relationship of the materials specifications and parent contracts is fully developed in the course. The course is directed to Government engineers concerned in materials engineering and the development of specifications. *Prerequisite:* Completion of the junior year in a school of engineering or equivalent experience.

Management of Government Purchasing (See p. 80)

Property Management (See p. 80)

Business Law (See p. 83)

552. Modern Engineering Materials

Spring, 2 credits

WILLIS S. MACLEOD and COMMODITY EXPERTS

Advanced elements, technological advances and developments in the field of applied engineering materials; lecture series by materials experts on such fields as ferrous and non-ferrous metals, plastics, adhesives, concretes, woods, ceramics, industrial synthetics, acoustical materials, preservatives and protective coatings, and new fields of materials as they are likely to enter the applied materials engineering field; forum discussion, following each lecture, by lecturers and a panel of selected assistants. *Prerequisite:* Engineering degree or equivalent or consent of the instructor.

553. Engineering in Materials Supply Operations

Fall, 2 credits

WILLIS S. MACLEOD

Engineering operations essential to effective materials and equipment supply in respect to construction of plant, manufacturing and maintenance of operations and from the Government's viewpoint of supply as a non-producing operation. The course covers the fields of designing, listing, requirements of purchasing officers for inquiry and allocation of contract awards, distribution and warehousing, use application and serviceability, reclamation and surplus, and those engineering phases of classification, item identification and standardization of the most serviceable and economical items for specified end uses. *Prerequisite:* Engineering degree or equivalent or consent of the instructor.

554. Protecting Engineering and Scientific Developments Through Patents

Spring, 2 credits

ALBERT J. KRAMER

This course is intended to supply the need of engineers and scientists for practical information concerning inventions and patents. Beginning with a discussion of the need of patent protection in our competitive economy, the course will cover: a review of the United States patent system; the steps that an inventor should take to protect his invention; analyses of some important historical patents; how to interpret patents for novelty and infringement; how patents, trade marks, and copyrights are distinguished; what rights employees and employers have to inventions made by the employees; how patent rights may be dealt with; how to determine inventorship among co-workers; how to determine patent priorities between independent inventors; the elements of inventive intelligence; and other matters of particular importance to engineers and scientists, especially those in the Government service. *Prerequisite:* Degree in one of the sciences, or equivalent, or consent of the instructor.

Introduction to Public Administration (See p. 69)

Federal Administrative Management (See p. 70)

The Social Problems of Administration (See p. 113)

Office Management (See p. 54)

Work Measurement and Performance Standards (See p. 73)

Reporting to Top Management (See p. 70)

Seminar in Agricultural Policies (See p. 96)

DIVISION OF SURVEYING AND MAPPING

MARSHALL S. WRIGHT (Chairman)

[210.] Elementary Surveying

215. Route Surveying

Fall, 3 credits

HOWARD S. RAPPEYE

Theory and practice of surveying for railroads, highways, canals; preliminary and location surveys, cross sections, earthwork quantities and transition spirals. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

216. Ground Methods of Topographic Surveying

Spring, 3 credits. (Every third year)

HOWARD S. RAPPEYE

Transit and stadia; plane table and stadia; approximate methods, special methods for peculiar conditions; Beaman stadia arc; Baldwin solar chart, etc. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

[217.] Astronomy for Engineers (1948-49 and every third year)

HOWARD S. RAPPEYE

[218.] Geodetic Surveying (1949-50 and every third year)

HOWARD S. RAPPEYE

[219.] Computation and Adjustment of Geodetic Observations (1949-50 and every third year)

HOWARD S. RAPPLEYE

Architectural Drafting

(See p. 123)

212. Elementary Aerial Photogrammetry

Year, 3 credits each semester

W. S. HIGGINSON

Basic geometric characteristics of aerial photographs, flight planning, basic optics, basic photography and laboratory practice, photographic materials, aerial cameras, radial line plotting methods, mosaics, interpretation of photographs.

[213.] Advanced Aerial Photogrammetry

G. C. TEWINKEL

214. Cartography

Year, 2 credits each semester

GEORGE H. EVERETT

This course is intended to include a study of maps and charts and certain aspects of surveying that is necessary for their proper understanding. First semester: A history of maps emphasizing the influences of early cartographers on contemporary map making; a study of the various Federal surveys with emphasis on their authorization, history, and jurisdiction; basic field data required for cartographic compilation, control surveys, topographic surveys (including elementary photogrammetry), and hydrographic surveys; the elements of map projection, including the theory and construction of the more widely used projections; the use of grids including the State Coordinate Systems.

Second semester: Will be devoted essentially to a study of the compilation and reproduction of topographic maps, nautical and aeronautical charts, and will include a review of the important map collections; methods of cartographic representation; the use of plastics; the various methods of map and chart reproduction; and the use of electronics in mapping. *Prerequisite: Trigonometry.*

DIVISION OF FINE ARTS AND ARCHITECTURE

GILBERT STANLEY UNDERWOOD (Chairman)

321. Pencil Sketching and Freehand Drawing

Fall, 2 credits. Repeated in Spring and Summer

WALTER G. CADMUS, JR.
ROWLAND LYON

Study of shade, shadows, and perspective. An intensive study of theory, harmony of lines, and pictorial and outdoor sketching. Each student receives individual criticism. Open to both beginners and advanced students.

322. Art Appreciation

Fall, 2 credits. Repeated in Spring

CHARLES M. RICHARDS

Behind the scenes with the artist. This course is designed to create an awareness of art, to help form intelligent judgment of one's own and to create fresh interest in creative work and better taste in art.

Visual training will be developed by analyzing works of the old masters and the moderns, from case drawing to present idioms. Demonstrating the fundamentals of plastic and architectural composition—textures, mediums, dynamic color and design. Art in relation to time and place. A course for artist and layman.

[334.] Modern Painting (1948-49)

CHARLES M. RICHARDS

323. Drawing for Portraiture and Illustration

Fall, 2 credits. Repeated in Spring and Summer

PIETRO LAZZARI

How to begin and finish a portrait in drawing or painting. Choice of media and materials, composition and color. Lectures based on theory of old masters and proven moderns alike. Planning and preliminary sketching to insure successful execution.

320. Water Color Painting

Fall, 2 credits. Repeated in Spring

ROWLAND LYON

Theory and practice; painting from landscape and still life.

331^a. Home Decoration

Fall, 1 credit. Repeated in Summer

HARRIET GARRELS

For amateurs and homemakers. Principles of arrangement; making the most of what we have; color; walls; window treatments; floor coverings.

331^b. Home Decoration

Spring, 1 credit. Repeated in Summer

HARRIET GARRELS

Furniture woods; American and English period styles; contemporary furniture; modern decorating problems. Work in 331^b is not based on work in 331^a.

332. Advanced Home Decoration

Fall, 1 credit. Repeated in Spring

HARRIET GARRELS

A continuation of Course 331. For amateurs and homemakers. Lighting, pictures—selection, framing, hanging; flower arrangement; accessories—pottery, mirrors, etc.; oriental rugs; textiles. *Prerequisite:* Home Decoration or equivalent.

[327.] Domestic Architecture**[505.] Functional House Planning**

LENORE E. SATER and J. ROBERT DODGE

[315.] Theory of Modern Architecture**316. Landscape Development of the Small Property**

Fall, 2 credits

JOSEPH C. GARDNER

The purpose of this course is to encourage and direct the creative impulse of the person interested in the landscape development of the small property, thus creating more interest and pleasure in the home. The course will include an outline of the basic principles of land planning and their application to the design of the small property, with discussion of the principles of composition in relation to the selection and use of plants and other materials. The practical application of landscape design principles to specific problems. A discussion of the physical aspects of landscape development including construction methods, horticultural standards and maintenance requirements. Each member of the class will be required to submit a statement concerning his program for the plan and development of his property or property of his selection.

317. Lawns and Plant Materials

Spring, 2 credits

JOSEPH C. GARDNER

Design and use of plant materials as related to methods of landscape development. Consideration will be given to the following topics: lawns, grading, drain-

age, construction and maintenance; planting design, including use and selection of materials; and planting operations and maintenance. *Prerequisite:* Landscape Development of the Small Property or familiarity with site planning procedures as approved by the instructor.

318. City Planning and Urban Development

Spring, 2 credits

S. E. SANDERS

A lecture course designed to explain the background of development, disintegration, and proposed methods of redevelopment of American cities.

The first half of the course will include the general history of urban growth and an exploration of the causes of disintegration and their effects. The second half will be devoted to the analysis of city planning methods relative to solutions for betterment of present conditions in our cities. The course is especially directed to persons who are active in civic work.

324. Basic Mechanical Drawing I

Fall, 2 credits

LEO G. D. WIEMER

The use of drawing instruments. Lettering and dimensioning. Problems in conventional presentation of objects by means of lines, including geometrical problems, orthographic projection and auxiliary projection. One hour lecture and three hours drafting room work each week.

325. Basic Mechanical Drawing II

Spring, 2 credits

LEO G. D. WIEMER

Advanced instruction. Developments and intersections. One hour lecture and three hours drafting room work each week. *Prerequisite:* Basic Mechanical Drawing I or equivalent.

340. Architectural Drafting I

Fall, 2 credits

LEO G. D. WIEMER

Study of wood framing and related building materials; architectural symbols. Drawing of plans, elevations, sections and construction details for a frame building from sketches. One hour lecture and three hours drafting room work each week. *Prerequisite:* Basic Mechanical Drawing II or equivalent.

341. Architectural Drafting II

Spring, 2 credits

LEO G. D. WIEMER

Study of masonry construction and related building materials. Drawing of plans, elevations, sections and construction details for a masonry building from sketches. One hour lecture and three hours drafting room work each week. *Prerequisite:* Architectural Drafting I or equivalent.

342. Architectural Drafting III

Fall, 2 credits

LEO G. D. WIEMER

Site plan study and drawing. Large scale drawing of exterior and interior details for frame and masonry buildings. One hour lecture and three hours drafting room work each week. *Prerequisite:* Architectural Drafting II or equivalent. (Open to persons who have taken Architectural Drafting in previous years.)

343. Architectural Drafting IV

Spring, 2 credits

LEO G. D. WIEMER

A continuation of Architectural Drafting III, with advanced instruction in the same subject material. Outline study of the Orders of Architecture. One hour lecture and three hours drafting room work each week. *Prerequisite:* Architectural Drafting III or equivalent.

305. Elements of Statistical Drafting

Fall, 2 credits

NELSON P. GUIDRY

A practical course in drafting involving actual preparation of statistical maps and charts in class. Explanations of short cut methods of lettering technique and arrangement of component parts of illustrations. Comparability and evaluation of individual charts and maps in a series will be analyzed. Complete illustrations will be prepared in ink ready for publication. The reduction, reproduction, and color application to statistical maps and charts will be explained.

Graphic Methods of Presenting Statistics

(See p. 43)

. DIVISION OF TECHNICAL ARTS

R. G. HAINSWORTH (Chairman)

188. Glass Blowing

Year, 2 credits each semester

L. B. CLARK

A laboratory course for technicians. Simple manipulation of joining, bending, and shaping is carried through to the production of useful apparatus. Metal in glass and glass to metal seals of all types are made. During the first semester the soft glasses are utilized for practice; during the second semester the related glasses are used. Ample opportunity for advanced work is given those who show themselves particularly adapted to the work. (New students may be admitted in the Spring if space permits.)

329. Home Gardening

Spring, 2 credits

WILBUR H. YOUNGMAN

A lecture and discussion course designed to present the fundamentals of gardening for the amateur. Beginning with a discussion of design, the course briefly covers the preparation of soil, selection of plant materials, planting, cultural practices, protection from insects and diseases, pruning, and propagation of shrubs, perennials and annuals for the home garden. The home production of vegetables and fruits will be discussed briefly with emphasis on culture under Washington conditions.

Lawns and Plant Materials

(See p. 122)

Introduction to Farming

(See p. 93)

COMMITTEE ON PHOTOGRAPHY

IVON H. BLACKMAN, JR., Facilities Engineer, Technical Services Section, School Lunch Division, Food-Distribution Programs Branch, Production and Marketing Administration, USDA (Chairman)

DAN M. BRAUM, B.S.A., Division of Training, Office of Personnel, USDA

EDWARD S. COBB, Head, Specifications and Tests, Research and Development Department, U. S. Naval Photographic Center, Navy Department

RAYMOND DAVIS, Chief, Photographic Technology Section, National Bureau of Standards, Department of Commerce

H. R. HARMON, Manager, Washington Office, Ansco Division, General Aniline and Film Corporation

R. J. LEFEBVRE, B.C., Chief, GPO-Department of State Service Office, Department of State

KEITH B. LEWIS, A.B., Manager, Government

Sales Division, Washington Office, Eastman Kodak Company

JAMES H. McCORMICK, M.S., Executive Assistant to the Director, Office of Information, USDA

ELBRIDGE C. PURDY, Chief, Photographic Section, Photographic and Duplicating Services Division, Office of Plant and Operations, USDA

WILL H. TOWLES, Master Photographer, Past President, Photographers' Association of America and former Director of the Association's School

LYNN R. WICKLAND, Chief, Reproduction Division, Army Map Service, War Department

70. Popular Photography

Fall, non-credit. Repeated in Spring and Summer

FRANK S. KNOBLOCK

This is a lecture, demonstration course of a non-technical nature. It is intended particularly for those camera enthusiasts who desire a clearer understanding of how their cameras, films and prints work. Better pictures should be the result of taking this course. Topics covered: camera types and operation; popular film types and uses; filters; judging exposure; planning pictures and composition; lighting, natural and artificial; posing hints; taking action pictures and hints on the use of color film.

Art Appreciation

(See p. 121)

192. Fundamentals of Photography I

Fall, 2 credits. Repeated in Spring and Summer

C. A. BRIGGS

This course forms a foundation for all of the other courses in photography. It offers a thorough grounding in elementary optics, physics, chemistry and composition as related to basic photographic operations. Topics covered: lenses, their make-up and function; characteristics of negative emulsions and printing papers; methods of correct exposure; the theory of development; fixing and washing processes; fundamental concepts of composition; and principles and uses of filters.

193. Practice of Photography I

Fall, 2 credits. Repeated in Spring and Summer

C. A. BRIGGS

ELBRIDGE C. PURDY

This course furnishes laboratory practice and demonstration of the principles taught in Fundamentals of Photography I. It offers the student an opportunity to become familiar with recommended procedures and techniques. Topics covered: contact printing and processing; selection of printing papers; processing of negative roll film, cut film and film pack; diagnosis and remedy of processing defects; types of cameras, their operation and uses, and the application of filters. This course may be taken concurrently with Fundamentals of Photography I. *Prerequisite:* Fundamentals of Photography I. (Persons who have completed Basic Photography in former years may enroll.)

Introductory College Physics

(See p. 64)

194. Fundamentals of Photography II

Fall, 2 credits. Repeated in Spring and Summer

EDWARD S. COBB

A continuation of Fundamentals of Photography I. Subjects included are: practical sensitometry and gradation control; the theory of projection printing; line and mass in picture arrangement; the nature of photographic light, its characteristics, control and measurement; shutter types and their performance; chemistry of photographic processes and the use of color film. *Prerequisite:* Fundamentals of Photography I. (Persons who have completed Applied Photography in former years may enroll.)

Elementary Aerial Photogrammetry

(See p. 121)

195. Practice of Photography II

Fall, 2 credits. Repeated in Spring and Summer

ELBRIDGE C. PURDY

A continuation of Practice of Photography I. Subjects included are: application of sensitometric measurements, projection printing, print correction, composite printing, lighting, rendition of form and texture, light patterns, principles of portraiture, the effect of light on color, retouching, toning and print analysis. *Prerequisite:* Practice of Photography I. (Persons who have completed Applied Photography in former years may enroll.)

[197.] Chemistry of Photography

JOHN D. FAUST

General College Chemistry

(See p. 58)

307. Color Photography—Theory

Fall, 2 credits

ALBERT R. MATERAZZI

Designed to cover the general development of color photography and to acquaint the student with current advances and discoveries. Includes: colorimetry; subjective and objective color reproduction; color cameras; emulsions; tripacks, bipacks and monopacks; Kodachrome and Dye Transfer; Ansco Color and Printon; screen plates and lenticular process; separation negatives; masking; toning; primary color and coupling development; Gaspar color process; carbonyl process; and Diazo and bleach-out photography. *Prerequisite:* Fundamentals of Photography II or equivalent or comparable photographic experience approved by instructor.

308. Color Photography—Practice

Fall, 2 credits. Repeated in Spring

HARVEY B. MOHR

A laboratory course in the application of color reproduction theory to color photography. Includes: spectral transmission of filters; sensitivity of emulsions; color separations; color printing processes; multilayer film and printing materials; and dye processes. *Prerequisite:* Color Photography—Theory and Practice of Photography II or comparable practical photographic experience as approved by instructor.

360. Portrait Photography

Year, 2 credits each semester

WILL H. TOWLES

A studio and darkroom course that provides opportunity for practice. The student learns through individual guidance the subtleties of fine portrait work. Lighting, posing, composition, processing and re-touching. *Prerequisite:* Practice of Photography II. (Persons who have completed Applied Photography in former years may enroll.)

Drawing of Portraiture and Illustration

(See p. 122)

[361] Commercial Photography (1948-49)**PHOTOGRAPHIC SEMINAR**

The Photographic Seminar provides an opportunity for Graduate School students and others to continue the study of photography in all its phases. Last year lectures were given on such subjects as: sensitometry, composition, subject matter, color processing, working materials, print quality and work planning. The Seminar conducts one or more salons each year for the membership. The Seminar is planning a series of special lectures during the 1947-48 school year which will be open to the public. Announcements will be made of each lecture.

Meetings are held on the first and third Friday of each month. Persons who complete Practice of Photography II are eligible for membership. Information about the Seminar may be secured from Mr. Elbridge C. Purdy.

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Index

- Accounting, 51, 81-84
- Accrediment, 12
- Administration, Graduate School, 3, 6
- Administrative Law, 79
- Administrative Procedures, 50-54
- Agricultural Finance, 94, 95
- Agriculture, 93, 96, 104, 105
- Air Conditioning, 117
- Air Traffic Management, 109
- Architectural Drafting, 123
- Architecture, 122-124
- Art, 121, 122, 124-126
- Auditing, 51, 84

- Balkans and Middle East, 106
- Beekeeping, 20
- Beltville Graduate School Committee, 4
- Biological Sciences, Department of, 19
- Birds of D. C. Area, 21
- Books, 8, 11, 18
- Budgetary Administration, 52, 74, 75
- Bureau of Standards' Courses, 43, 65
- Business Law, 83

- Calendar, inside front cover
- Certification, 13
- Certified Statement of Accomplishment, 13, 37, 48, 68, 81, 92
- Chemistry, 58-60
- Clerical-Administrative Procedures, 50-54
- Communication, 106, 107
- Congressional Assistants, 70
- Contracts and Specifications, 118, 119
- Cooperatives, 96, 98
- Correspondence Study, 7
- Counseling
 - Courses, 76, 78, 111
 - Student, 11, 13, 35, 48, 67, 87, 92

- Degree Requirements, 12
- Drafting, 123, 124
- Drawing, 121-123

- Economics
 - Agricultural, 92-96
 - Agricultural Policy, 96, 97
 - Consumption, 97, 98
 - General, 89-92
 - Health and Medical, 99, 100
 - Labor, 100, 101
 - Prices and Marketing, 95, 96
 - Production, 93, 94
- Editing, 27
- Engineering, 116, 117, 119
- Engineering Administration, 118-120
- English
 - Composition, 23
 - Creative Writing, 24
 - Editing, 27
 - Foreign Students, 24
 - Grammar, 24
 - Practical English Usage, 24
 - Radio Script, 28
 - Readable Writing, 27
 - Vocabulary Building, 24
- Entomology, 21
- Extension, 97

- Faculty, 10, 133
- FAO Program, 105
- Farm Management, 93
- Filing, 53
- Financial and Budgetary Administration, 52, 74, 75
- Fine Arts, 121, 122
- Foreign Languages
 - Directed Study, 31
 - French, 32
 - German, 32
 - Intensive Program, 30
 - Italian, 32
 - Russian, 33
 - Spanish, 33, 113

- Gardening, 122, 124
- Geography and Geology, 61
- Glass Blowing, 124

- Government, 69, 72, 103, 105
 Graphic Methods, 43
- Health Services Programs, 99, 100
 History of the Graduate School, 5
 Home Decoration, 122
 Hydraulics, 117, 118
 Hydrology, 63
- Indexing, 29
 Information Media, 27
 Interior Decorating, 122
 International Relations, 102-106
 Internships in Sampling, 37
 Interviewing, 46, 111
- Japan, 106
- Labor Economics, 100, 101
 Landscape Development, 122
 Languages, Foreign, 29-34
 Languages and Literature, Department of, 23
 Law, 77, 79, 83, 120
 Lectures, 8, 36, 96
 Legal Administration, 79
 Letter Writing, 54
 Library Facilities, 11
 Literature, 25
- Machine Tabulation, 44
 Management, 70, 72, 73, 118
 Mapping, 121
 Marketing, 95
 Mathematics, 40-42, 51, 83
 Mathematics and Statistics, Department of, 35
 Mechanical Drawing, 123
 Mechanics, Applied, 117, 118
 Medical Economics, 99, 100
 Metallurgy, 63
 Meteorology, 63, 64
 Middle East, 106
- Nutrition, 22
- Office Management, 54
 Office Techniques and Operations, Department of, 48
- Organization and Methods Analysis, 72, 73
- Painting, 122
 Patents, 120
 Payroll Procedure, 52
 Personal Development, 29
 Personal Finances, 98
 Personnel Administration, 53, 75-78
 Photogrammetry, 121
 Photography, 124-126
 Physical Sciences, Department of, 58
 Physics, 64, 65
 Plant Breeding, 22
 Political Science, 69, 103-106
 Poultry Husbandry, 20
 Presentation Methods, 26
 Price Analysis, 95, 96
 Printing Procedures, 29
 Program of the Graduate School, 6-8
 Property Management, 80
 Psychology, 103, 109-112
 Public Administration, Department of, 66
 Public Administration
 Financial and Budgetary Administration, 74, 75
 General Administration, 69, 70, 113
 Government-Public Relationships, 71, 72
 International, 104
 Legal Administration, 77, 79, 83, 118-120
 Organization and Methods Analysis, 72-74
 Personnel Administration, 53, 75-78, 111
 Procurement and Property Management, 80, 118, 119
 Publications, 8, back cover
 Purchasing, 52, 80, 119
- Quality Control, 47
- Radio, 26, 28
 Records Management, 53
 Refrigeration, 116
 Regulations of the Graduate School Admission, 14

- Attendance, 15
- Classification of Courses, 15
- Credit and Grades, 16
- Fees, 16
- Prerequisites, 14
- Refunds, 17
- Registration, 15
- Transfer of Credit, 16
- Veterans, 14
- Withdrawal, 16
- Research Methods, 45, 46, 71, 92, 95, 97
- Rural Electrification, 117
- Rural Social Policies, 97
- Russia, 105
- Safety Engineering, 77
- Sampling, 37, 46, 47
- Schedule of Classes, 8
- Secretarial Practices, 55
- Seminars, 22, 25, 47, 79, 91, 94-97, 100, 103, 104, 126
- Shorthand, 55-57
- Social Sciences, Department of, 85
- Sociology, 97, 112-114, 123
- Soil Sciences, 62, 63
- Speech, 25, 26, 28
- Statistics, 43-47, 92, 97, 124
- Summer Session, inside front cover
- Surveying, 120
- Tabulating Equipment, 44
- Tax Accounting, 84
- Taxation, 90
- Technology, Department of, 115
- Tests and Measurements, 76
- Traffic Management, 109
- Training Management, 78
- Transportation, 108, 109
- Utility Engineering, 117
- Veterans, 14
- Veterans Legislation and Administration, 77
- Visual Presentation, 28
- Vocabulary Building, 24
- Work Measurement, 73
- World Politics, 103
- Writing, 24, 25, 28, 54, 70



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